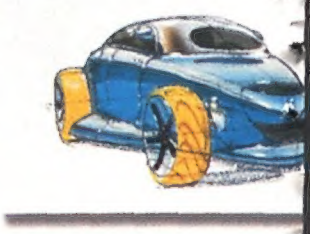
Smithsonian

December 1996

GEORGES DE LA TOUR (p. 74)

A CAR IS BORN.

May 15, 1990:
Inspired by childhood memories, a designer at Pacifica, Chrysler's California design studio, scribbles the words "production hot rod" on a 3"x 5" card.



August 13, 199
Designer walks in
colleague's office
with loose sketch
21st century open-w
roadster. That eveni
a group gathers to dis
how it could be bui

February 1, 1996:
"The only action more outrageous than creating a Prowler show car is building copies for sale to the public. Proving that this is not your average car company, Chrysler Corporation intends to do just that."- Motor Trend, February 1996

January 10, 1996:
Wearing shades à la Jake and Elwo
Chrysler Chairman Bob Eaton a
Bob Lutz wheel Prowler prototype
Detroit Auto Show to announce
that it will become a limited production 1997 Plymouth.

What's the point of building an outrageously cool concept car if the closest anyone can get to it is behind a velvet rope at some auto show? That's what we thought too. At Chrysler Corporation, concept vehicles aren't just exercises in corporate van They're laboratories for testing new ideas. Wl people respond to those ideas, we pay attenti Sometimes we incorporate them into your next

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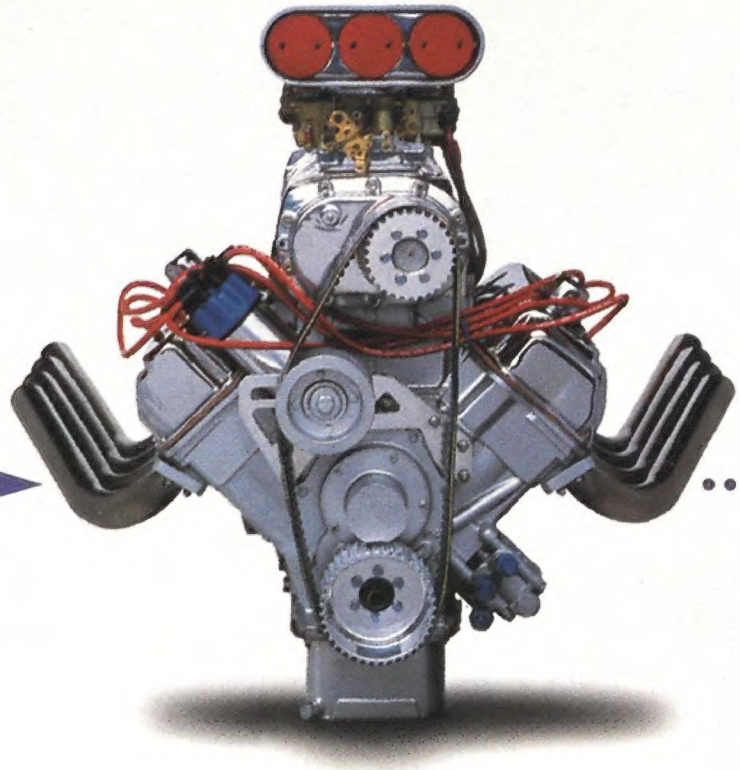
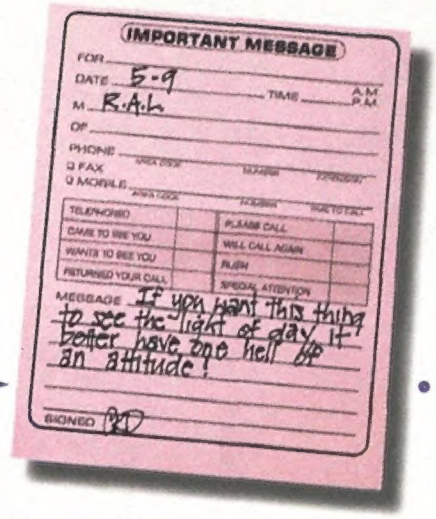


September 18, 1990:
Chrysler Design Chief Tom Gale starts work on his own custom street rod.

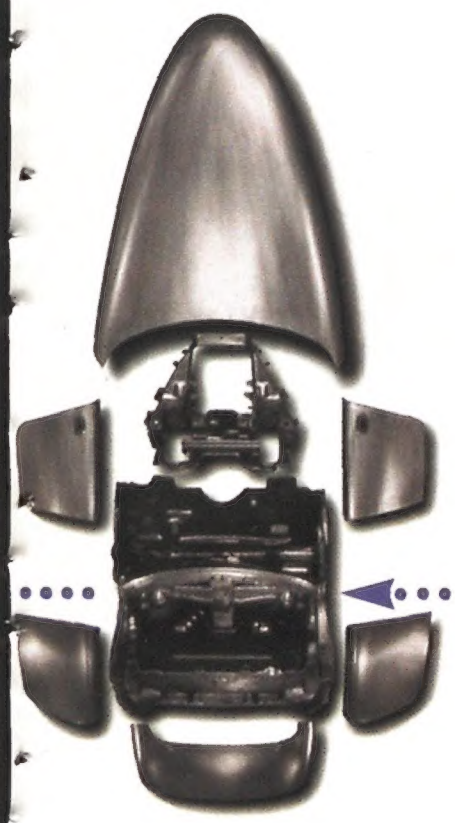


May 9, 1991:
Chrysler top management gets wind of project. Message from President Bob Lutz: "If you want this to see the light of day, it better have one hell of an attitude."

May 20, 1991:
Lutz is shown scale model of concept car. Grinning, he agrees with recommendation to build full-size version. Project is named "Prowler."

May 10, 1992:
Chrysler team travels to the NSRA Street Rod Nationals for research, inspiration, and rousing performance by Peter Noone and Herman's Hermits.

January 7, 1993:
Prowler show car draws huge crowds at Detroit Auto Show, followed by impassioned pleas to put it into production.



April 15, 1995:
First prototype body parts, fabricated entirely from aluminum, are delivered.

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on the stand. It's what you do when great cars are
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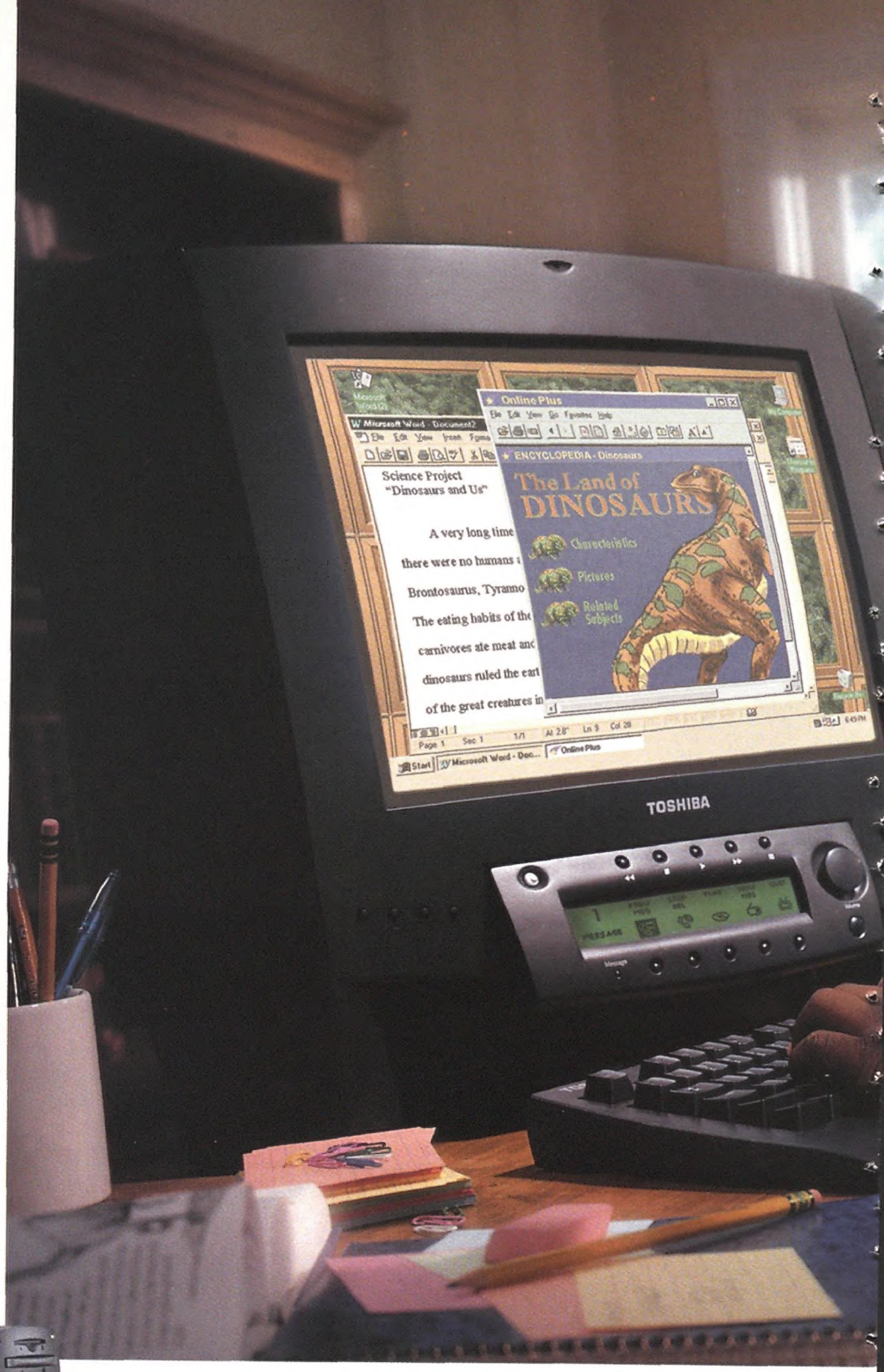

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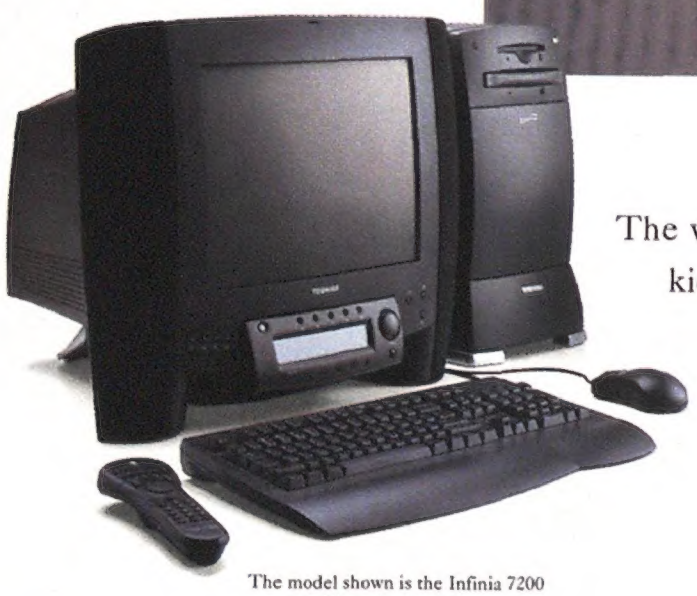

The model shown is the Infinia 7200 with optional monitor.

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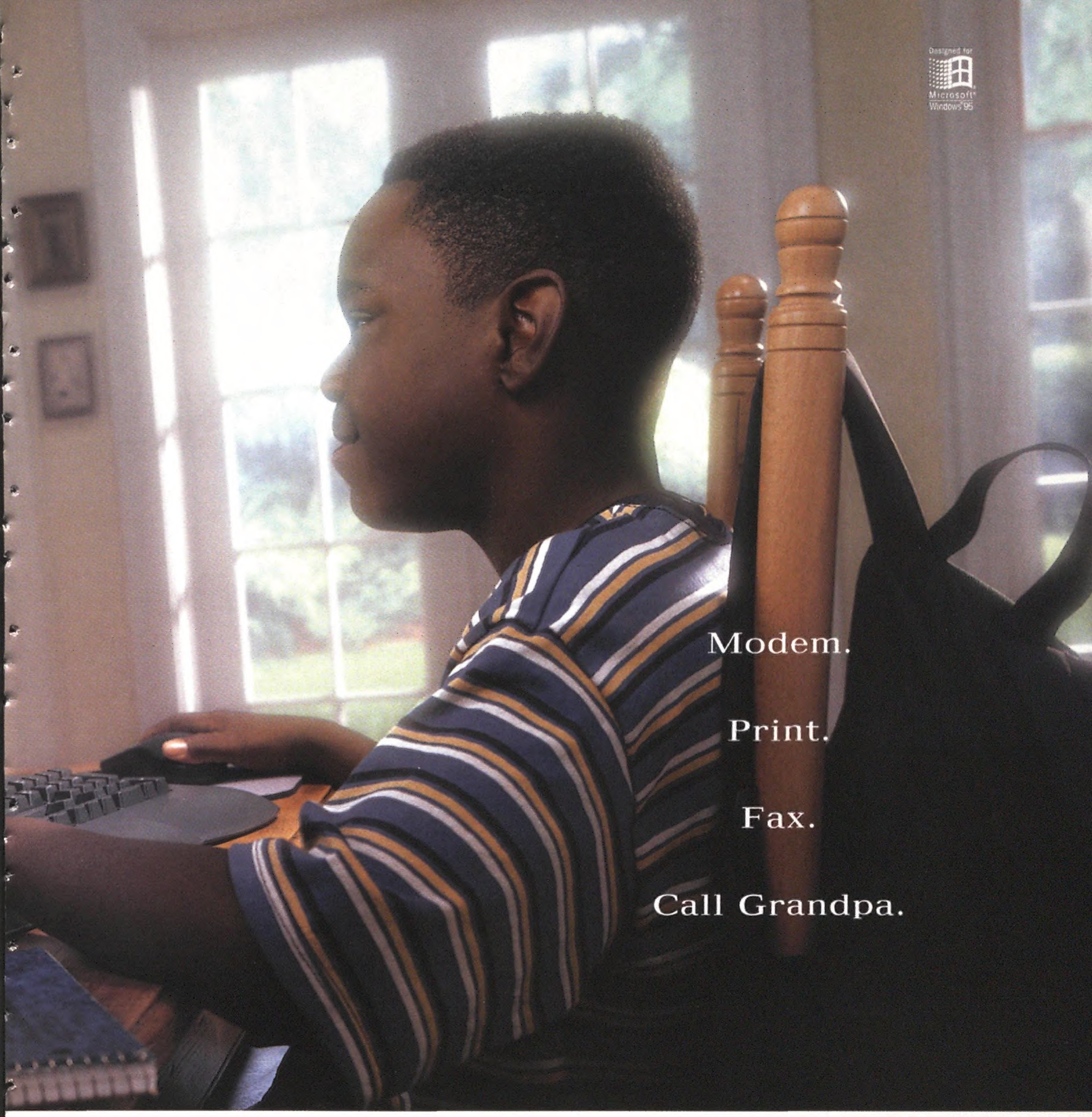

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In Touch with Tomorrow

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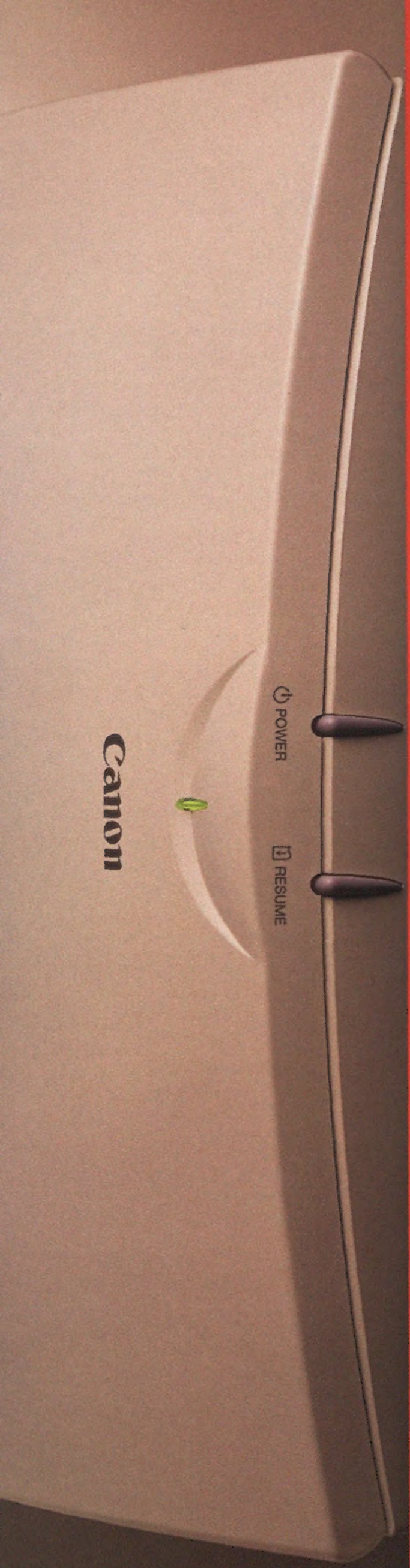

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Smithsonian *features*

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The plump berries in your grocery are products of a gas soon to be banned—but not for the reason you'd think
By Jeff Wheelwright, photographs by Chad Slattery

54 Hooked on the sport with the hole in the middle
Ice fishing may leave you cold, but Minnesotans love it—shacks, schnapps, extra socks, flying tullibees and all
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66 The *Verae peculya* business of naming new species
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Armed with computer languages, physics and creativity, students at DigiPen conquer the world of video-game design
By Richard Wolkomir, photographs by Robert Holmgren

100 Hurry! Hurry! Step right up for Coney Island!
See an empty strip of sand in Brooklyn become the world's most famous amusement spot! Have your nickel ready!
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Scientists at the Smithsonian's Panama research institute study everything from animal migrations to ice ages
By John F. Ross, photographs by David W. Harp

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Defying 19th-century conventions, the novelist was determined to follow her heart in all areas of her life
By Robert Wernick

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A MAN'S GUIDE *to buying* DIAMONDS

You're getting her A DIAMOND this Christmas. *Seek professional help IMMEDIATELY.*

Maybe you know a little something about diamonds. Maybe not. In any event, chances are she may know more than you do. So get some information. Then you can impress her with your knowledge, as well as with the diamond you bought.

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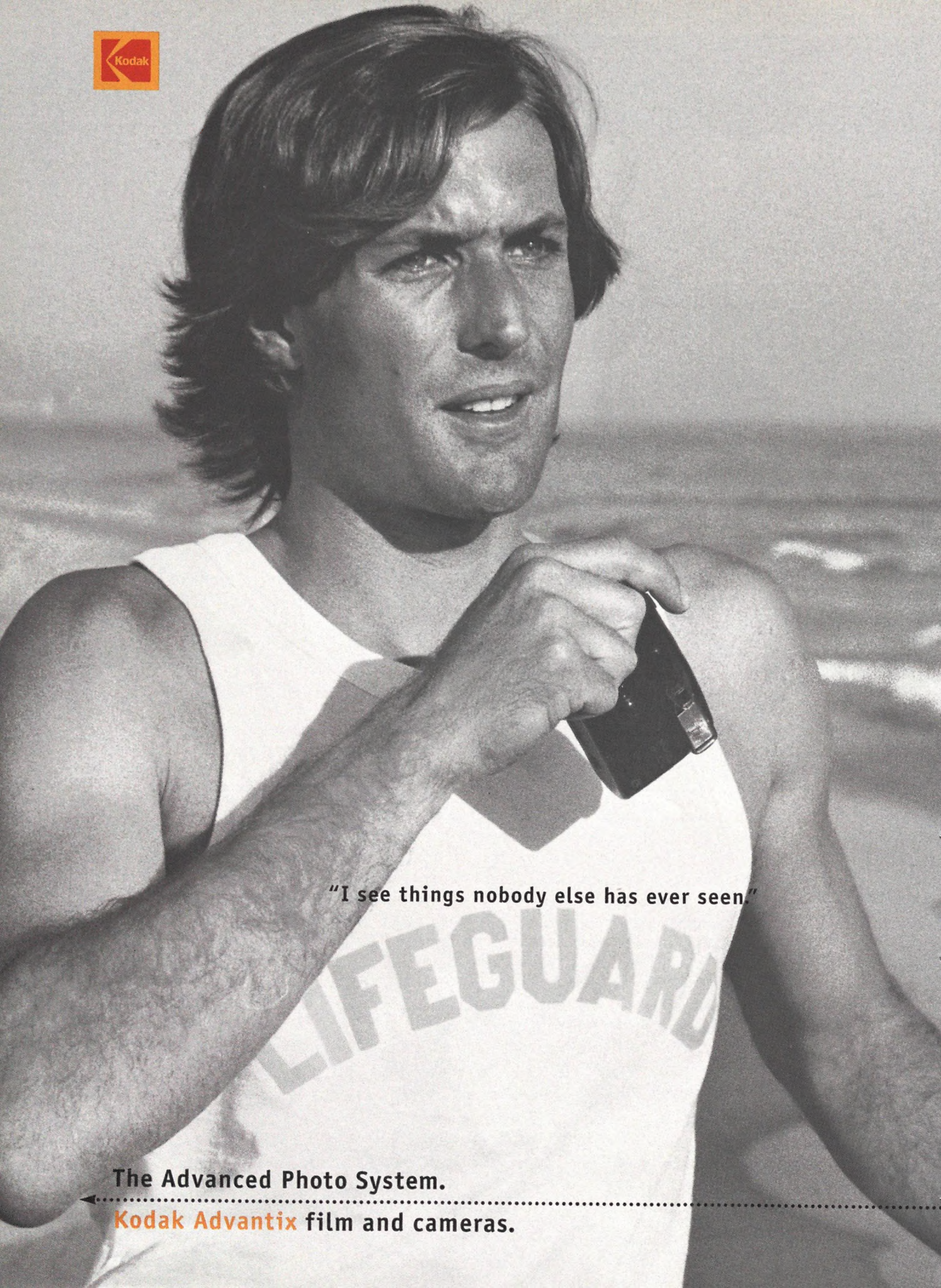
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Cover:
The fair-skinned, shifty-eyed thief in Georges de La Tour's *The Fortune-Teller* (detail), c. 1630, is probably Preciosa, the well-born heroine of a novel by Cervantes. Kidnapped by a gypsy, she was raised as her granddaughter (p. 74)
Metropolitan Museum of Art

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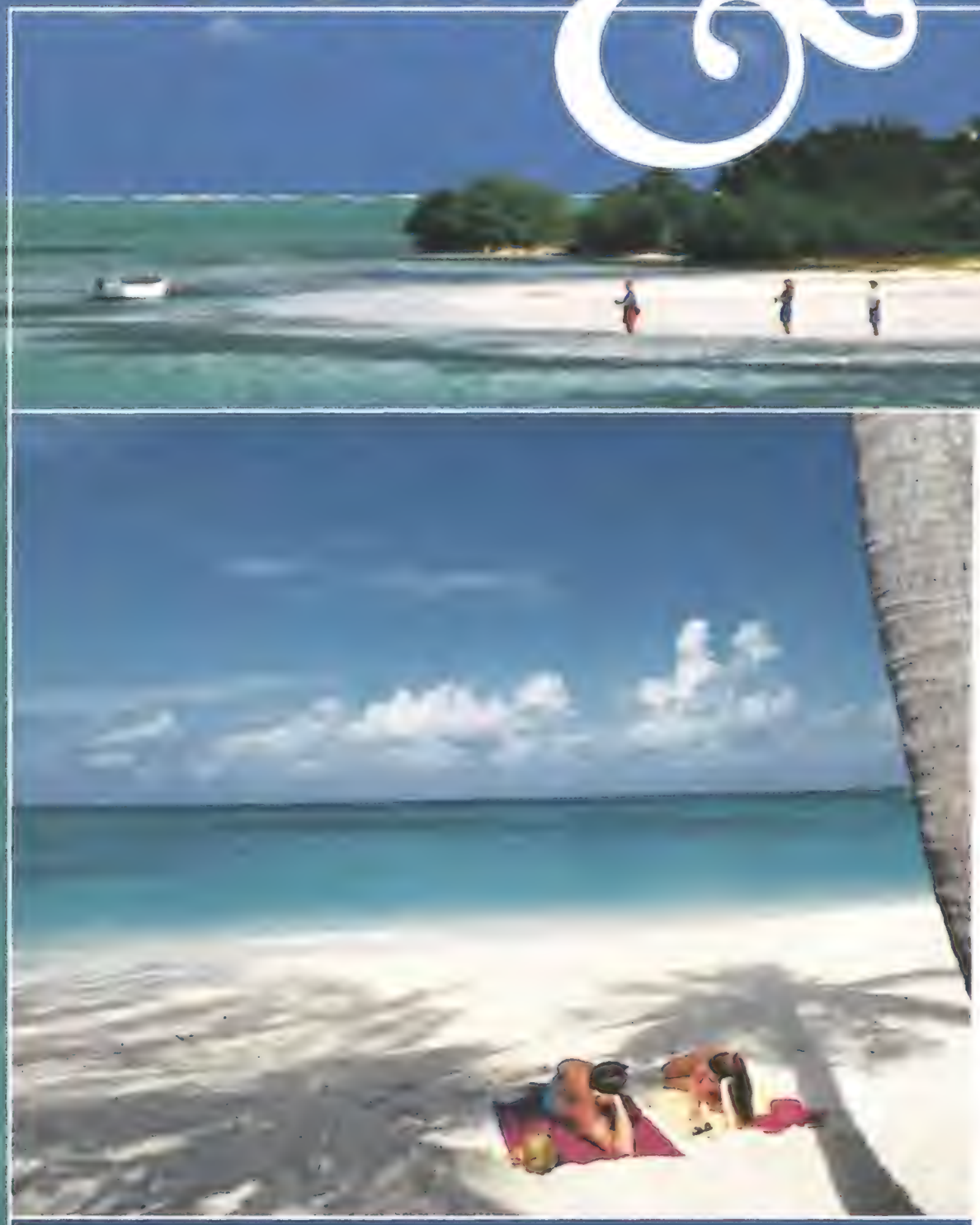

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Secretary Heyman's comments

Smithsonian Perspectives

"Red, Hot & Blue," a new exhibition saluting the American musical, is an invigorating example of the Smithsonian's mission to illuminate our past

The 150th anniversary of the Smithsonian has been punctuated by a number of museum exhibitions in addition to the marvelous traveling show "America's Smithsonian." This column is devoted to "Red, Hot & Blue," an exhibition jointly mounted by two Smithsonian museums: the National Museum of American History and the National Portrait Gallery, and housed at the latter. I attended its opening on October 24, the date I composed this column. You have read about the exhibition in the November issue of SMITHSONIAN, but I want to add my personal perspective.

"Red, Hot & Blue" tells the story of American musicals and, in the words of the exhibition brochure, "showcases the Broadway and Hollywood musical from its immigrant roots in nineteenth-century vaudeville, through its heyday on both the 'Great White Way' and the silver screen, to its redefined cultural role today."

And it does it very well, especially for someone like me, who as a teenager in New York City in the 1940s and early '50s was taken by my family to a host of hits of the day (*Oklahoma!; Kiss Me, Kate*; *Guys and Dolls*; *South Pacific*; *Brigadoon*; *Carousel*) but had no idea of either the genesis of American musicals or their significance as an authentic American art form.

There was more than theater for a youngster in New York City at that time. Our parents and grandparents listened to the music of the previous decades (Irving Berlin, George and Ira Gershwin, Jerome Kern, Victor Herbert, George M. Cohan, Eddie Cantor, Al Jolson, Sophie Tucker), and we all went to the "musical" movies (*The Wizard of Oz, Meet Me in St. Louis, Cover Girl, An American in Paris, Gigi*).

Until I saw our exhibition and read the accompanying book (the authors, Amy Henderson and Dwight Bowers, so well exemplify the finest qualities of Smithsonian curators), I had not realized that my slice of time as a teenager and a young adult was when popular culture largely celebrated optimism, patriotism and assimilation. The past I had not shared, nor the pessimism and loss of faith in a buoyant American character that were yet to come. All of us, in small or large part, have a worldview shaped by the popular culture of our youth. Whether it realistically prepares us for the challenges of middle age is debatable, but I feel fortunate that mine was acquired when it was.

We often use the metaphors of the wheel or the pendulum to describe cultural change. This exhibition ends with several 1990s revivals of classic musicals (*Show Boat, Guys and Dolls, The King and I*). The presentation has changed, but the themes of my youth reappear, often joined by a more realistic appreciation of America's central dilemmas. In writing about the revived *Show Boat*, our curators note the focus on "what remains a central paradox of America's democracy—its inherent racial ambivalence." But, as they also point out, "*Show Boat* still radiates what one critic has called 'the idealistic chutzpah of Kern and Hammerstein. Their work is full of love—for a romantic ideal that's gone, for a fraternal ideal that never arrived.'"

This exhibition, for me, is an example of what the Smithsonian does so well. It mixes memory and careful social analysis in a way that suffuses us with the warmth of tradition while educating us about themes we never knew or have forgotten. Of course, as readers of this column well know, this is not all that we do. The Smithsonian has exemplary science and art museums as well as strong research capacities. And we have a wonderful zoo. But most people think of us as the repository of American history and culture, chock full of icons and representative objects. Using these well—telling compelling stories of our past that not only inform and entertain us but give us new insights that enrich our understanding—with luck, leads toward the realization of the deepest values of this democracy. This, in my view, is our greatest calling.

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Letters to the Editor

Nuremberg Trials

I was most interested in reading Robert Shnayerson's October article on the Nuremberg trials of Nazi war criminals. In May 1945 my uncle, Capt. Neil Sweeney, was a paratrooper with the 101st Airborne Division and was serving as the military governor of Marquartstein, Austria. A local citizen passed a note to my uncle, telling him the hiding place of Robert Ley, who was the powerful organizer of the German Labor Front and leader of the Reich Organization. "I went over to the house mentioned in the note," my uncle wrote his father, "and sure enough there was my good friend Dr. Robert Ley, asleep in his sack. I told him to get up and make it snappy. . . . He said he couldn't understand why we wanted him. I had a man from the company with me who was a German Jew. I thought he was going to kill Ley."

My uncle vividly described to me how Ley attempted to poison himself at the time of his capture but was thwarted by an Allied soldier who knocked the bottle out of Ley's hand. My uncle noticed his prisoner was wearing a ring and feared Ley might have hidden a cyanide capsule in it, a common practice among high-ranking Nazi officers. My uncle confiscated the ring, which was etched with the insignia of the Third Reich. In the end, Ley cheated the justice system by hanging himself with a towel in a Nuremberg jail cell on October 25, 1945, while awaiting trial.

My uncle served in the U.S. Army for 41 years and achieved the rank of colonel. He wore Ley's ring throughout his career. After he died, his widow donated the ring to the 101st Airborne's museum at Fort Campbell, Kentucky.

Joseph J. McElwee
Drexel Hill, Pennsylvania

Underground Railroad

I wish historian Anthony Cohen could have met my great-great-grandparents, Benjamin and Almira Ramage. During the 19th century they kept a general store in Enon Valley, Pennsylvania. Farmers brought wagonloads of raw wool to the store that they bartered for merchandise. Runaway slaves were sometimes hidden in the wool, and the Ramages then shielded them at the store. Their daughter Martha, who was

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too young to be suspected of abetting fugitives, brought food to the slaves.

I learned this from a note that Martha's daughter left in a tiny glass mug that had been used to measure cinnamon drops in the store.

Jean Martin
Pittsburgh, Pennsylvania

Pumpkins

I have an update for Sue Hubbell's article on pumpkins. Shortly after the issue arrived, a gourd named The Great Can Do weighed in at a world-record 1,061 pounds at the Clarence [New York] Pumpkin Festival. The circumference of Can Do is 14½ feet. The World Pumpkin Federation, which was founded in 1983 by Ray Waterman, awarded the $50,000 prize for the first half-tonner to The Great Can Do growers, Paula and Nathan Zehr.

Albert C. Lawrence
Lowville, New York

You wrote that the "first published pumpkin pie recipe" was that of Amelia Simmons in 1796. Hers is, indeed, the first like our modern pie, but an earlier recipe appeared in *The Compleat Cook,* which was published in London in 1671. The ingredients for "pumpion pye" include a half-pound of sliced pumpkin; parsley, sweet marjoram, rosemary and thyme; cinnamon, nutmeg, pepper and six cloves; ten eggs, six egg yolks and "a good deal of sweet butter"; sliced apples, currants and white wine.

I made this pie in 1995, and although it took a lot of time to prepare, the finished product was surprisingly good—*much* better than I had expected.

Clarissa F. Dillon
Haverford, Pennsylvania

New York's Animal Medical Center

I am a pediatric cardiologist and did my postgraduate fellowship at Cornell University Medical College. I participated in a weekly pediatric medical-surgical cardiovascular conference to discuss children who were candidates for cardiovascular surgery to repair their congenital heart defects. After several weeks of attending the conference, I noticed several health care professionals whom I never saw the rest of the week at the New York Hospital-Cornell Medical Center. My mentor, Dr. Mary Allen Engle, said they were veterinarians from the Animal Medical Center who had many canine and feline patients with the same congenital cardiovascular problems as those of our patients. The veterinarians were always interested in the latest medical and surgical techniques for diagnosis and treatment so they could apply them to the animal kingdom.

Seymour I. Hepner, M.D.
Fairfax, Virginia

Jordanian statues

The full-length Stone Age statues from Jordan look just like Michael Jackson—especially the two on the left.

Carla Hatfield
Culver City, California

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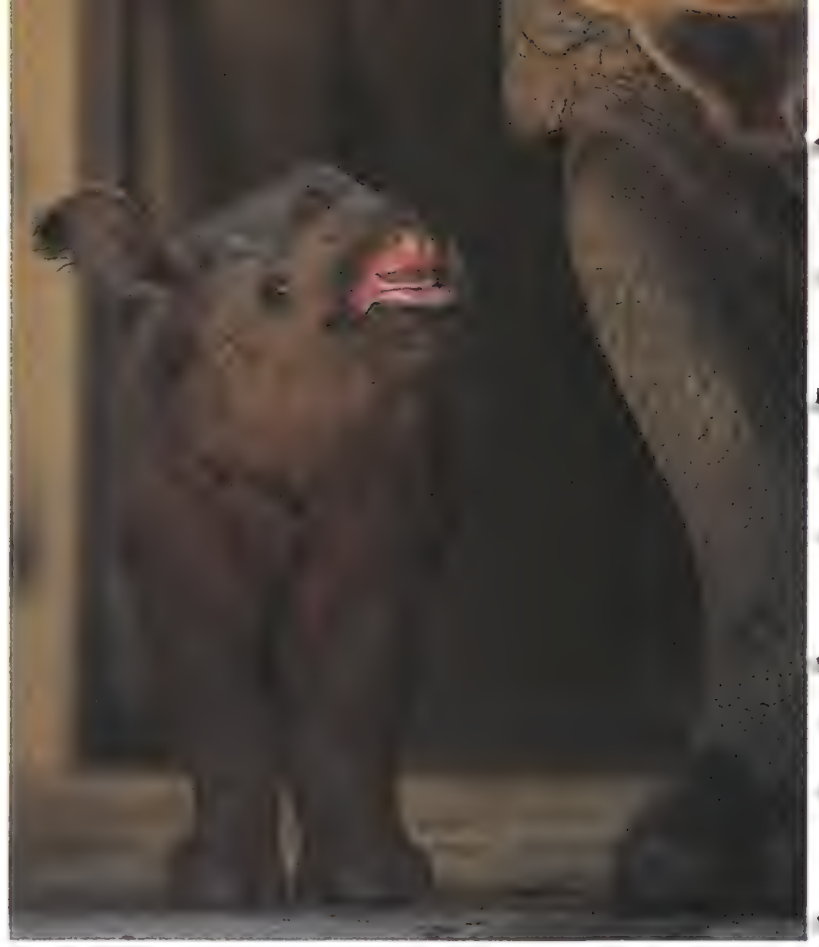
Around the Mall and Beyond

By Michael Kernan



Since her arrival in September, baby Chitwan has charmed visitors and curators alike; the birth of a rhino is a rare event and hasn't been seen at the National Zoo since 1974

She's cute, all right. I mean, you want to pick her up and dandle her. I wasn't prepared for that.

She is an exact miniature of her mom, down to the last knob and pimple. They look like they're wearing mother-and-daughter outfits.

Except for the horn.

Baby Chitwan weighed 138 pounds when she was born September 18 at 3:55 A.M. She gained 51 pounds in the next 11 days, and then the scale broke. But that happens with rhinoceroses. Her mother, Mechi, weighs 3,600 pounds.

Chitwan, named for the Royal Chitwan Park in Nepal, where her mother came from, is about the most popular resident at the National Zoo in Washington. For the first few weekends after she was born, the lines stretched out the door of the Elephant House, where she lives with other rhinos, elephants, hippos, giraffes and potbellied pigs.

"This birth is pretty rare," says John Lehnhardt, assistant curator for large mammals. "In the last 2½ years in North America there have been only ten births of this species, and there are only 45 of them on this continent. For us, this is the first successful birth since 1974."

Right now Mechi is striding about, with the baby close at her heels. This is sweet, but it is also a basic survival technique, for these rhinos come from a land where the wild grasses can grow 25 feet tall, and a baby rhino, or a baby anything, or you or I for that matter, could get lost in a minute.

Mechi is nervous. She is extremely protective, especially right now. She sees humans she doesn't know hanging around and staring at her. She doesn't like the look of that tape recorder, either, so she makes a threatening move toward the bars. We back away.

"Of course, for the vets it's a standard problem. They hate the vets, with their needles and all," says Morna Holden, who has been caring for Mechi and the other female rhino, Kali, ever since they arrived here nine years ago as babies themselves.

"They recognize the keepers who work with them all the time by their light-colored shirts.

"People in dark shirts are apt to be workmen, who make sparks with their welding machines and hammer on things. So they aren't so happy with dark shirts."

When a photographer climbed all over the enclosure to take the first pictures of the baby, Mechi was amenable since the woman wore a light shirt. She came back later, however, wearing a dark blue outfit. Mechi made a distinctly rude gesture with her massive horn.

After breakfast and a shower, delivered through a hose by Holden, Chitwan and her mom keep busy with a stroll outside, a roll in the mud and then a snooze in the sun. When visitors arrive, the pair are usually sleeping.

The afternoon is Chitwan's best time.

"She runs and runs," says Holden. "She goes outside and gallops and gallops. One day a keeper came by with a white food cart, and Chitwan came flying through the air right across the enclosure, snorting and squealing. She was just playing, I think. Practicing. She's getting more personality every day."

Well, personality is as personality does. I am not so sure I want to dandle her anymore.

"The baby will nurse for two years," says her keeper, "though she'll get solid foods, too, after six months, like soft grass and maple leaves with the stems pulled off. The baby nurses every hour, night and day. And she's gaining five pounds a day."

To enable her to make all that milk, Mechi puts away more than half a bale of hay a day, say 30 pounds, plus 8 pounds each of fresh produce and grains, and a whole lot of water.

"She's picky," observes Holden. "She'll eat carrots if that's all there is, but she'd rather have something sweeter, like apples or sweet potatoes. They love green beans."

The mother is so tenderly attentive that staff keep wandering over from other duties to watch them. Mechi is careful not to roll on her baby, her first after a stillbirth. Both of them defecate in the same place every day, which is typical of rhinos, and Mom always covers Chitwan's bright orange production with her own dark brown one.

Perhaps this keeps enemies from knowing there is a baby around. Rhinos have few diseases and no enemies at all in captivity, of course, but in the wild there are tigers. To a tiger, a baby rhino is a walking appetizer.

"In Chitwan Park," says curator Lehnhardt, "there are 450 rhinos but also a hundred tigers. And they take out 10 to

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Mechi, the mother, is tenderly attentive to her calf—and extremely protective.

50 percent of the baby rhinos. This may look like a hefty baby to you, but to a 400-pound tiger, it's just a morsel."

When rangers in Nepal come across a baby rhino eaten by tigers, generally all that remains is a pair of tufted ears.

Those ears are something else. They work independently, and since they are, with the nose, a rhino's sharpest sense organs, they waggle all the time, harking to every little squeak and shuffle, swiveling about like radar dishes.

"I am partial to elephant babies," remarks Lehnhardt, who spent the first part of his career working with elephants in zoos in Chicago and Calgary. "But I'd never seen a baby rhino. And this one has won me over. She's a doll."

(The father, by the way, is Sport, age 16, now on loan to the Philadelphia Zoo. Sport also impregnated Kali who, at press time, had just given birth to a 150-pound male. All of a sudden, the National Zoo is up to here in rhinos!)

"The breeding is pretty amazing," says Lehnhardt. "Very determined on both sides. The act itself can take an hour. The female can only conceive for a few hours during estrus. She gives clear signs when she's ready, she vocalizes, urinates, stops eating and starts climbing the walls."

Pregnancy takes 15 to 17 months, and a mother can have a baby no more than once in three years. They nurse from one to two years.

"Rhinos are very instinctive," Lehnhardt says, "and they know what to do in a birth. We basically watch, and keep ready in case help is needed. The baby has to hit the floor breathing, and the mother has to want to care for it. It has to be able to stand and then to nurse. If they pass those tests, they'll be okay."

Now Mechi is trotting. She moves at a steady pace, her huge bulk riding smoothly on her stumpy legs, her head held high with an eerie sort of dignity. The baby trots just behind her, not quite as dignified, but getting the hang of it. The two of them head for a pile of hay, where Chitwan will get her hourly snack of mother's milk.

"They're an endangered species, all right," says Lehnhardt. "Men and tigers are the problem. Their grazing lands are steadily being reduced, and they're hunted for their horns and skin."

Think about this: we worry over the fate of elephants, because there are only 650,000 left. There are 11,000 rhinos. Of this species, the greater one-horn Asian rhino, there are only 2,000—on the whole planet.

The other four species are the Javan rhino and the Sumatran in Asia, and the black and white rhinos of Africa.

"Being able to breed them is our safety deposit for the future," Lehnhardt says. "It's important that people see them in the zoo, see the baby and fall in love with it. We may get three million people in this one building in a year. Our mission is to create a concern for the species itself and the wilderness in general.

"We humans are part of the continuum of life on earth. We brought the rhino to the brink of extinction. It's up to us to try and bring them back."

Rhinos don't roar. They chirp and whistle and hee-haw like donkeys, which is natural because they are related to horses and tapirs. (I could see the equine features in Chitwan's long, blunt snout.) They also seem to make sounds below human hearing.

Rhino eyes are famously weak, and some people believe the animals' so-called bad temper is simply a startled reaction to a threat they can't see. I must say, Chitwan's eyes are not impressive. With that dimly searching Mr. Magoo expression, she looks as though she could use glasses.

This also may be why Mechi is so very protective. Even when she is just moving from one room of her enclosure to the other, she checks it out like a Secret Service operative, sniffs, listens, pokes into piles of hay, while Chitwan waits by her rear hoof.

Interestingly, the rhinoceros is the only existing animal I can think of that has what I would call a dinosaurian name. Tyrannosaurus, "rhinosaurus"? Everyone comments on how prehistoric the creatures look. I also found a curious resemblance to early Japanese samurai armor with its wide-skirted, plated effect. It is true that coats of rhino skin have been worn as armor.

But not to worry about that fearsome horn. It serves well when charging a safari Land Rover, but for a real fight between angry males, the long, sharp lower front teeth are the weapon of choice.

I should also mention the birds. Sparrows and swallows and others love to hang about the big beasts, perching on their backs sometimes. Groupies. I wonder what the rhinos think of that.

Afternoon is Chitwan's best time, says her keeper. She gallops and gallops. With just 2,000 of this species left, breeding them is our "safety deposit for the future."

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Please read this information before you start taking FOSAMAX. Also, read the Patient Information leaflet each time you renew your prescription, just in case anything has changed. Remember, the leaflet does not take the place of careful discussions with your doctor. You and your doctor should discuss FOSAMAX when you start taking your medication and at regular checkups.

How should I take FOSAMAX?

These are the important things you must do to help make sure you will benefit from FOSAMAX:

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2. **After swallowing your FOSAMAX tablet do not lie down — stay fully upright (sitting or standing) for at least 30 minutes and until after your first food of the day. Do not chew or suck on a tablet of FOSAMAX.**
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   FOSAMAX is effective only if taken when your stomach is empty.
5. **If you develop difficulty or pain upon swallowing, chest pain, or new or worsening heartburn, stop taking FOSAMAX and call your doctor.**
6. Take FOSAMAX once a day, every day.
7. It is important that you continue taking FOSAMAX for as long as your doctor prescribes it. FOSAMAX can treat your osteoporosis only if you continue to take it.
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What is FOSAMAX?

FOSAMAX is for the treatment of osteoporosis (thinning of bone) in women after menopause. You will find more information about osteoporosis at the end of the leaflet.

How does FOSAMAX work?

FOSAMAX works by:

- Reducing the activity of the cells that cause bone loss
- Decreasing the faster rate of bone loss that occurs after menopause
- Increasing the amount of bone in most patients

These effects are seen as soon as three months after therapy with FOSAMAX has begun. These effects continue as long as you keep taking FOSAMAX. The density of bone increases and the bone is less likely to fracture. Thus, FOSAMAX reverses the progression of osteoporosis.

Who should not take FOSAMAX?

Patients with:

- Certain disorders of the esophagus (the tube that connects your mouth with your stomach)
- Inability to stand or sit upright for at least 30 minutes
- Low levels of calcium in their blood
- Severe kidney disease
- Allergy to FOSAMAX

Patients who are:

- Pregnant or Nursing

FOSAMAX is for use by women after menopause. If you are pregnant or nursing, you should not be taking FOSAMAX. Talk to your doctor.

What other medical problems should I discuss with my doctor?

Talk to your doctor about any:

- Problems with swallowing
- Stomach or digestive problems
- Other medical problems you have or have had in the past

What are the possible side effects of FOSAMAX® (alendronate sodium tablets)?

Like all prescription drugs, FOSAMAX may cause side effects. Side effects usually have been mild. They generally have not caused patients to stop taking FOSAMAX. However, some patients may develop chest pain or severe difficulty or pain upon swallowing due to serious reactions such as irritation or ulceration of the esophagus (the tube that connects your mouth with your stomach). This may occur especially if patients do not drink a full glass of water with FOSAMAX and/or if they lie down in less than 30 minutes and before their first food of the day. It may also occur if patients continue to take FOSAMAX after developing symptoms suggesting irritation of the esophagus.

Some patients treated with FOSAMAX experienced abdominal (stomach) pain, which was the most commonly reported side effect. Less frequently reported were other digestive disturbances such as:

Nausea, heartburn, irritation or pain of the esophagus (the tube that connects your mouth with your stomach), vomiting, difficulty swallowing, a full or bloated feeling in the stomach, constipation, diarrhea and gas.

Muscle/bone pain, headache, or an altered sense of taste were also experienced by some patients. Rarely, a rash has occurred.

Anytime you have a medical problem you think may be related to FOSAMAX, talk to your doctor.

What should I know about osteoporosis?

Normally your bones are being rebuilt all the time. First, old bone is removed (resorbed). Then new bone is formed. This balanced process of resorbing and forming bone keeps your skeleton healthy and strong.

Osteoporosis is a thinning and weakening of the bones. It is common in women after menopause. Menopause happens when the ovaries stop producing the female hormone, estrogen, or are removed (which may occur, for example, at the time of a hysterectomy). After menopause, bone is removed faster than it is formed, so bone loss occurs and bones become weaker.

At the start osteoporosis usually has no symptoms, but it can result in fractures (broken bones). Fractures usually cause pain. Fractures of the bones of the spine may not be painful, but over time they cause height loss. Eventually the spine becomes curved and the body becomes bent over. Fractures may happen during normal, everyday activity, such as lifting, or from minor injury that would normally not cause bone to break. Fractures most often occur at the hip, spine, or wrist. This can lead to pain, severe disability, or loss of mobility.

How can osteoporosis in postmenopausal women be treated?

- **Medication.** Your doctor may prescribe FOSAMAX.
- **Lifestyle changes.** In addition to FOSAMAX, your doctor may recommend one or more of the following lifestyle changes:
  - **Stop smoking.** Smoking appears to increase the risk of osteoporosis.
  - **Reduce the use of alcohol.** Too much alcohol appears to increase the risk of osteoporosis and injuries that may cause fractures.
  - **Exercise regularly.** Like muscles, bones need exercise to stay strong and healthy. Exercise must be safe to prevent injuries including fractures. You should consult your doctor before you begin any exercise program.
  - **Eat a balanced diet.** Adequate dietary calcium is important to patients with osteoporosis. Your doctor can advise you whether you need to change your diet or take any dietary supplements such as calcium or vitamin D.

This medication is prescribed for a particular condition. Do not use it for another condition or give the drug to others. Keep FOSAMAX and all medicines out of the reach of children. If you suspect that more than the prescribed dose of this medicine has been taken, drink a full glass of milk and contact your local poison control center or emergency room immediately. Do not induce vomiting. Do not lie down.

The Patient Information leaflet provides a summary of information about FOSAMAX. If you have any questions or concerns about either FOSAMAX or osteoporosis, talk to your doctor. In addition, talk to your pharmacist or other health care provider.

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Edward K. Thompson 1907-1996

Readers are never quite sure what an editor does. Writers, without whom no magazine can live, have only a vague idea, and try to forget what little they know. Readers are even more in the dark. Does he write? Does he choose? Does he preside and inspire? Does he sit around in shirtsleeves, smoking cigars and slashing copy with a fat red pencil?

The answer is all of the above, a claim that can be doubled and redoubled with regard to Edward K. Thompson, who died in October at age 89. Ed Thompson was some kind of genius, and no one who ever worked for or with him will ever forget the experience. He was also, though we say it who perhaps shouldn't, one of the great editors of the last half-century.

The record can be briefly stated. Moving from the *Milwaukee Journal* to *Life* in the late 1930s, he was its managing editor during the great years from 1949 to 1961, with time out during World War II to create a remarkable magazine called *Impact* for the Army Air Forces. At age 62 he came to the Smithsonian, at the request of then Secretary S. Dillon Ripley, to invent SMITHSONIAN magazine and serve as its editor and publisher. All editorial and publishing wisdom at the time decreed that general-topic magazines were doomed—the only way to make it was to take on a single subject, like sports or medicine. Brashly he declared the new magazine would deal with everything that the Smithsonian Institution "is interested in, might be interested in, or ought to be interested in." With no financial backing to speak of at the beginning, it quickly jumped to a circulation of 150,000, and eventually soared past two million.

He once wrote that he regarded the top editor of any publication as "the Old Man": "'The Old Man' to me is a guy who brings a strong personal flavor to editing. He has some crotchets that are the subject of wry office jokes, but all in all he is considered fairly Jovian. He rides his subordinates hard but is inclined to say nice things behind their backs. They feel that he will not pass the buck to them when he gets into trouble with the owner or other high authority."

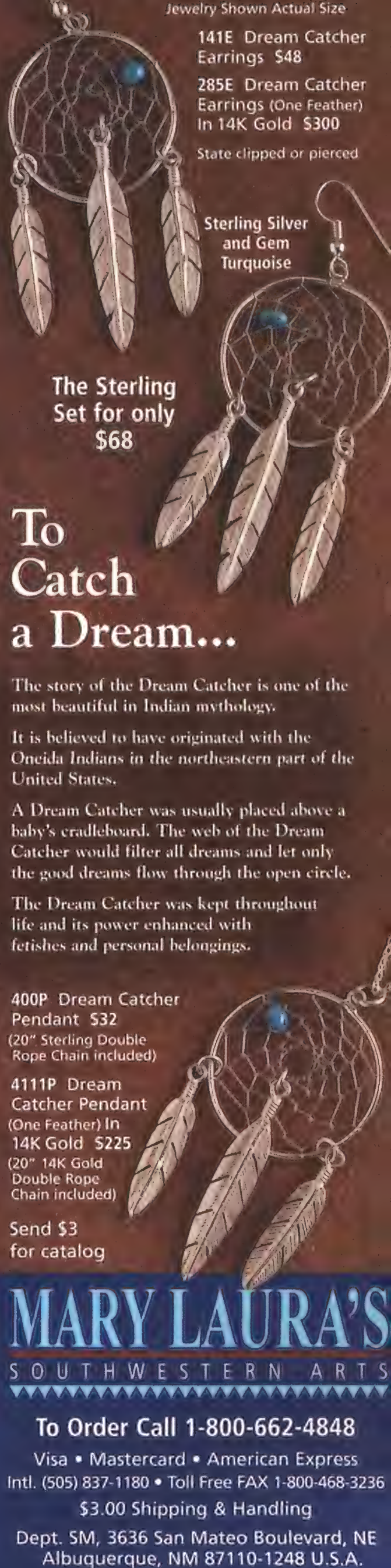
As the Old Man, Thompson was sparing of praise, but when he saw something he really liked he was apt to grin puckishly and say "Exemplary." He had an unerring way of jabbing a piece of text just where it began to wamble and bring it (and the writer) up short. Noting a minor bit of clumsiness by a subordinate, he admonished: "Excellence is a matter of doing a lot of small things well."

He wore a Stetson as a symbol of his North Dakota upbringing—although it's hard to imagine him on a horse. He liked to play the role of country boy, but in fact he was something of a closet intellectual who could insert a deftly chosen quote from the classics into any conversation. A cigar was always on duty, either in his hand or in his mouth; on occasion during layout sessions he would dribble ashes on a color transparency—the picture editors would have apoplexy. He loved music of every kind—classical, gospel and country, especially if it could bring a tear to his eye, like "Red River Valley."

On the wall of his office he kept a framed Jeff McNelly cartoon of a battle-scarred, cigar-chomping, defiant looking alley cat perched atop a typewriter. The caption said: "Editing is an honorable profession." He liked to see himself in the image of that old tom, ready to take on anything and anybody. But in a lot of ways the Old Man was a pussycat—generous, loyal to a fault, sentimental, a friend.

He described in detail how his own funeral service should be done, down to the choice of hymns and spirituals, and even specified that the congregation follow John Wesley's 1761 manual and "sing lustily and with good courage." That's an editor for you!

The Editors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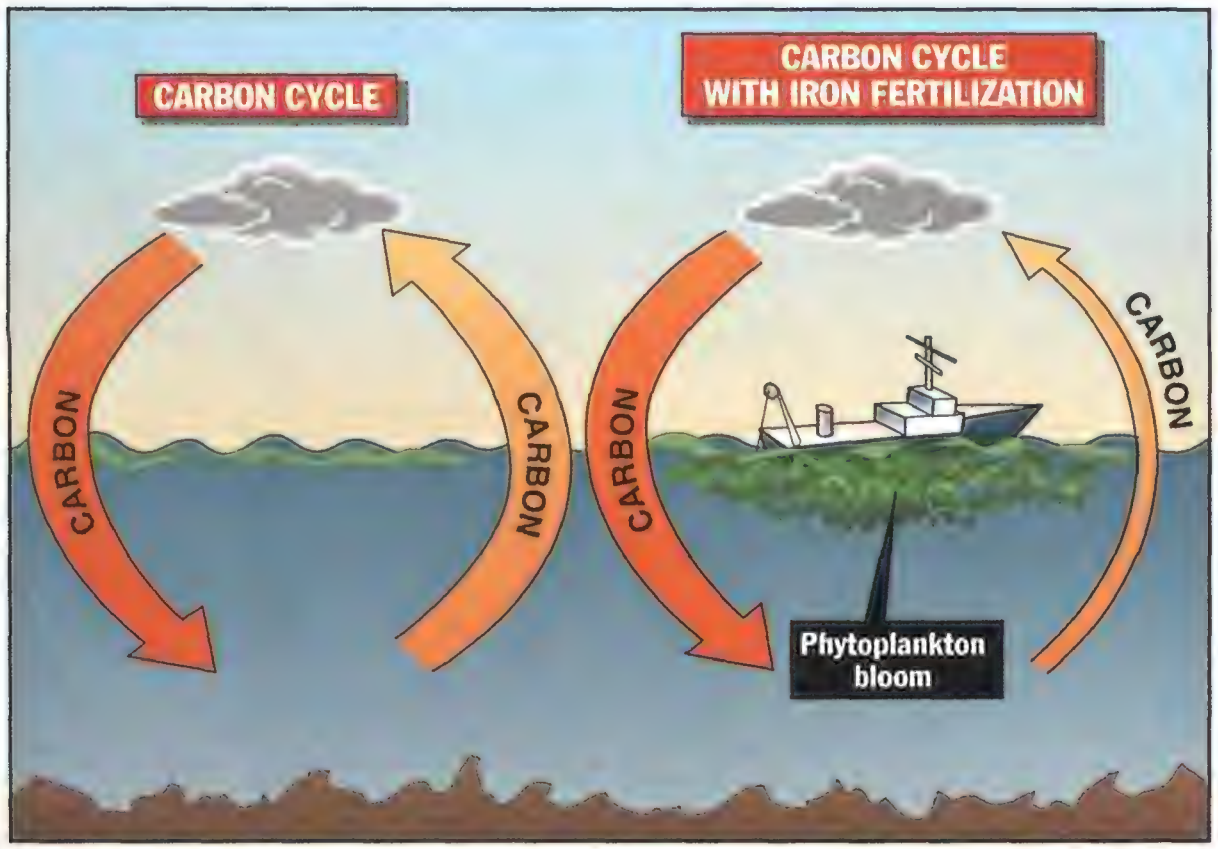
Phenomena, Comment and Notes

By James Trefil

Experiments at sea show we can cause phytoplankton to bloom in areas where it otherwise would not. This could remove carbon dioxide from the atmosphere and slow global warming



In the never-ending carbon cycle, atmosphere and ocean are in near equilibrium (left). In parts of the ocean with high nutrient levels but little plant life, adding iron causes a bloom, and some carbon is taken out of the cycle (right).

A light industrial area on the outskirts of Salinas, California, is probably the last place that you would think to look for an oceanographic institute. Yet, that is exactly where I found the Moss Landing Marine Laboratories, the birthplace of one of the decade's most startling scientific experiments.

The experiment, carried out in May and June of 1995, in an open stretch of the Pacific 800 miles west of the Galápagos Islands, involved an attempt to stimulate the growth of plankton by dumping iron into the ocean. During the two weeks of the experiment, the additional plankton that resulted from the fertilization pulled about 2,500 tons of carbon from the water, carbon that eventually would be in large part replenished from the atmosphere.

It was 1987 when oceanographer John Martin at Moss Landing first conceived what has come to be called the "iron hypothesis." Martin, who died in 1993, was a rather extraordinary individual. Working from a wheelchair since a bout with polio, he nonetheless managed on occasion to ship out with his research teams aboard the cramped, overcrowded vessels that are the oceanographer's primary labs. He noted that there are huge areas of ocean (mainly in the waters surrounding Antarctica and in the equatorial Pacific) that have large amounts of nutrients in the form of nitrogen compounds, but very few plankton. These regions also seem to have very low concentrations of iron—on the order of two parts per trillion. Just as lack of a single vitamin or trace mineral can stunt the growth of humans, Martin argued, the dearth of plankton in these otherwise nutrient-rich waters was because of the scarcity of iron.

What interested first Martin and now his successor, Kenneth Coale, are the ocean's phytoplankton—minute floating plants that, like all plants, pull carbon dioxide from their environment and convert it into molecules that they need to live. Think of them as the oceanic equivalent of prairie grass. Stimulating a plankton bloom is the equivalent of fertilizing a prairie. The plants remove carbon dioxide from the atmosphere (directly or indirectly) and store the carbon in their tissues.

Finding ways to remove carbon dioxide from the atmosphere has become a serious business. The surface of the earth is heated by the sun. So-called greenhouse gases—carbon dioxide, methane and water vapor, among others—prevent some of that heat from radiating back out into space. Even without any human activity, the world is about 60 degrees Fahrenheit warmer than it would be without this "greenhouse effect." By the burning of coal and oil—not to mention the burning of tropical rain forests—human beings now add measurable quantities of carbon dioxide to the atmosphere and may be raising the world's temperature.

But draw enough carbon dioxide out of the atmosphere, scientists predict, and that temperature will drop. "Give me a half a tanker of iron," Martin once said, "and I'll give you the next ice age." It wasn't all bluster. Scientists now estimate that iron fertilization could, in principle, remove as much as 20 percent of the human-generated carbon dioxide from the atmosphere at a cost less than alternatives such as large-scale tree planting.

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When the first field trial of the idea was conducted in the fall of 1993, shortly following Martin's death, however, things stopped looking so simple. This was what engineers call a "proof of concept" experiment. "The main purpose," says Coale, "was to see whether you could lay down a patch of iron-rich water in the ocean." The iron, in the form of iron sulfate, was fed through two pipes in back of the ship's propellers and dispersed into the ocean. "Being in an agricultural area like the Salinas Valley was a big help," Coale says. "All the equipment for moving around large amounts of fertilizer is available right here."

In a narrow sense, the first experiment was a success. A patch of iron-rich water formed. The concentration of phytoplankton in the patch, however, was only twice that of the surrounding water. In the minds of many, this constituted a serious failure of the whole idea.

There was at least one good reason for this disappointing performance. On the fifth day after the fertilization, less salty and therefore lighter water moved in, burying the patch under a hundred feet of water, away from the light.

I was at the meeting in San Francisco when these results were announced in 1994, and I was really taken aback by the reaction to them. As someone who has, during a checkered career, been involved in a couple of large-scale engineering projects, I wasn't surprised at this type of "failure." In projects like this, the first trial *always* fails—think of the first American attempts at spaceflight. What surprised me was the reaction of the environmental scientists present. It was almost as if there was a collective sigh of relief, as if the prospect that humanity might find an easy way out of the greenhouse problem was just too much for them to bear. Having heard many of those same scientists advocate the large-scale planting of trees to pull carbon out of the air, I couldn't help wondering why they were so dismayed at the notion of growing phytoplankton instead.

Coale and the study's other principal investigator, Ken Johnson, began the second-round experiment in May of 1995. The first surprise in that experiment came when they dropped the buoy overboard to mark their patch. "It took off at a knot and a half [about two miles per hour]," says Coale, who laughs about it now. "The whole patch was careening across the South Pacific, and we had to follow it. What a ride!" By the end, they had chased that particular patch over 950 miles.

The second surprise came when they started dumping the iron. Instead of putting it all in at once, they made three injections, spaced a few days apart. When they started, the water was a clear, electric blue—the sort of water that makes great photographs for travel posters but has almost no microscopic life in it. Their patch stayed on the surface this time, and in a few days the sea turned green for miles around as the phytoplankton took up the iron and multiplied. "It was like sailing into a duck pond," says Coale.

All sorts of strange things happened in the patch. For example, the scientists were trailing long, sock-like nets in the water to pull up samples that would allow them to estimate the growth of plankton. As soon as the phytoplankton started to bloom, the inside of the nets gummed up with green scum. When scientists tried to raise them, the water wouldn't run out and the nets burst. "When things like that happen," Coale points out, "you don't need statistics to tell you the experiment is a success."

In the end, the phytoplankton mass increased thirtyfold, even more than predicted. Zooplankton counts went up, too, but only to twice the original number. "The grass just got ahead of the cows," is the way Coale characterized his observations.

Diatoms, a form of algae, sink when dead, taking carbon to the seafloor.

As a feasibility study, it's clear that the second experiment was a success. It also provided pretty convincing evidence for the iron hypothesis. At least one question remains, however: After phytoplankton bloom, what happens to the carbon when the plankton die?

"We didn't make any measurements, so I can't give you a firm answer to that," says Coale. "I can say, though, that the phytoplankton we saw were diatoms in long chains, which have a pretty high sinking velocity. When we went back into the patch after about two weeks, I saw lots of clumps of phytoplankton in marine snow configurations." ("Marine snow" is the remains of surface-dwelling organisms that clump together and fall constantly to the bottom of the world's oceans. Coale calls the clumps the "dust bunnies of the seas.") At the moment, then, there seems to be a reasonable chance that iron fertilization could pull large amounts of carbon from the atmosphere and store it on the ocean floor.

Some engineers are already talking about how ocean fertilization might be implemented on a larger scale, by systematically releasing iron into the waters surrounding Antarctica. How does someone like Coale, who has devoted his career to studying the oceans, feel about this sort of thing?

"There are a lot of things I'd want to think about before we did anything like that," he says. Pressed for specifics, he points out that as dead plankton sink, they will start to decompose in the upper half-mile of the ocean. In the lower part of this region, there is very little oxygen. If this oxygen is depleted, he argues, the decomposition process might start breaking up the nitrogen compounds and that, in turn, could affect the supply of nutrients on which a lot of the earth's fisheries depend. Obviously, this effect (and others) will have to be investigated before we start any large-scale geoengineering.

"It could well be that we will need iron fertilization as a last-ditch method of averting global warming," Coale says. "People haven't been very responsible about dealing with the problem up to now."

He pauses for a moment, then shakes his head.

"Wouldn't it be easier to try carpooling first?"

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Smithsonian Highlights

Plan a Smithsonian visit!

Join in the fun as the Smithsonian celebrates its 150th anniversary. *Receive a free Associates' planning packet.* Write Smithsonian Information, Smithsonian Institution, Washington, D.C. 20560, or call 202-357-2700 (voice) or 202-357-1729 (TTY), 9 A.M. - 5 P.M., Monday - Friday; 10 A.M. - 4 P.M., Saturday - Sunday. *Note:* Parking near the Smithsonian is limited. The Metrorail subway, convenient to all museums, has parking available at some stations (details in packet).

Begin your visit at the Smithsonian Information Center's Associates' Reception Desk—open 9 A.M. - 4 P.M. daily—in the Castle. Special materials await you there.

Museum Hours

Smithsonian museums are generally open 10 A.M. - 5:30 P.M. daily, except December 25. Hours at the National Zoo are 9 A.M. - 4:30 P.M. daily for buildings, and 8 A.M. - 6 P.M. for grounds.

Holiday Events

Traditions of Christmas, Hanukkah, Kwanza and the New Year will be observed at the National Museum of American History's annual Holiday Celebration, December 26 - 31, noon to 4 P.M. daily—music, storytelling, exhibits.

'America's Smithsonian'

George R. Brown Convention Center, Houston, Texas (December 6 - January 12, 1997) Centerpiece of the Institution's 150th anniversary celebration, the traveling exhibition of Smithsonian treasures continues its tour. *Note:* Admission is free, but passes are required. Advance passes are available for a service fee of $3.50 each: call 1-800-913-TOUR.

December Exhibitions, Events

National Museum of American Art
American Kaleidoscope: Themes and Perspectives in Recent Art (through February 2, 1997) Works by 14 contemporary artists. See *Highlights Continued*, page 36.
Lost and Found: Edmonia Lewis' Cleopatra (through January 5, 1997) Installation features the artist's long-missing sculpture *The Death of Cleopatra*, c. 1875.

Renwick Gallery
Calico and Chintz: Antique Quilts from the Patricia Smith Collection (through January 12, 1997) Early American quilts.

National Portrait Gallery
Red, Hot & Blue: A Salute to American Musicals (through July 6, 1997) Exhibition organized jointly with the National Museum of American History spotlights the major personalities who created the American musical theater.

National Air and Space Museum
How Things Fly New permanent gallery elucidates the basic principles of flight.
The Enola Gay (runs indefinitely) Exhibition features the forward fuselage of the *Enola Gay*, the B-29 that dropped the atomic bomb on Hiroshima.

National Museum of Natural History
Martian Meteorite (runs indefinitely) Display features meteorite from Mars containing microscopic structures and traces of organic compounds, suggesting life once existed on the red planet.
Eyes on Science: Illustrating Natural History (through January 1, 1997) Show highlights artists and works that have furthered scientific knowledge.

National Zoological Park
The Science Center at Amazonia (opens December 16) Permanent exhibition looks at the work of Smithsonian biologists worldwide.

National Museum of American History
Holiday Trees (December 7 - January 5, 1997) Decorations range from Colonial crafts to American Victorian.
From Smithson to Smithsonian: The Birth of an Institution (through January 5, 1997) Smithson's own books, 19th-century scientific apparatus, photographs.

National Postal Museum (Located next to Union Station on Capitol Hill)
Stamps & Stories (runs indefinitely) The stories behind the first stamp to picture an airplane and the first Christmas stamp.

Hirshhorn Museum & Sculpture Garden
Richard Lindner: Paintings and Watercolors, 1948-1977 (through January 12, 1997) Retrospective of the work of the German-born American artist.
The Collection in Context: Paul Gauguin (through May 7, 1997) Show features artist's sculpture *Cylinder Decorated with the Figure of Hina and Two Attendants.*

Freer Gallery of Art
In Human Form: Images of the Secular and Divine in Chinese Painting (through January 5, 1997) Paintings from the 11th to 18th century.

Arthur M. Sackler Gallery
Paintings by Masami Teraoka (through January 1, 1997) Works by the contemporary Japanese-born artist portray the realities of the late 20th century.

National Museum of African Art
Ceramic Gestures: New Vessels by Magdalene Odundo (through January 2, 1997) Recent works by the well-known contemporary ceramist from Kenya.

Arts and Industries Building
Points of Entry (through January 1, 1997) Exhibition surveys photography's role in documenting immigration.
Stories of the People (through August 10, 1997) Artifacts from the National Museum of the American Indian.

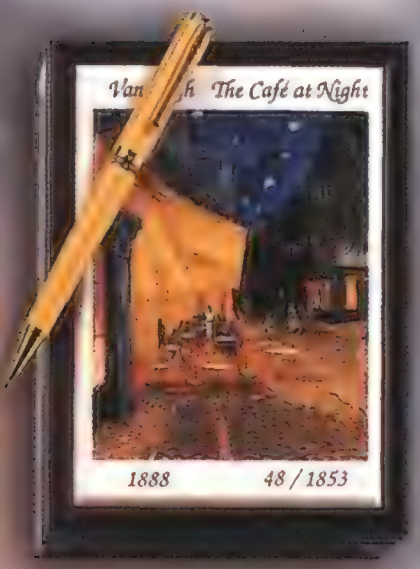
The Castle—Great Hall
Smithson's Gift Permanent display tells the story of the bequest that founded the Smithsonian 150 years ago.

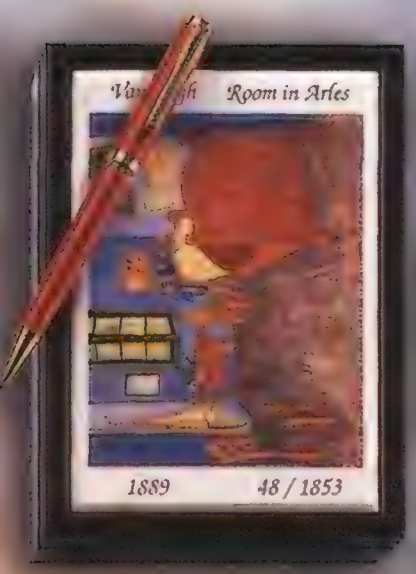
S. Dillon Ripley Center, International Gallery
Strong Hearts: Native American Visions and Voices (through January 5, 1997) Works by Native American photographers.

Anacostia Museum
Museum Renovation The museum will be closed for renovation for about ten months starting December 9.

Cooper-Hewitt, National Design Museum (New York City)
Mixing Messages: Graphic Design in Contemporary Culture (through February 16, 1997) U.S. graphic design, 1980-1995.

Heye Center, National Museum of the American Indian (New York City)
Contemporary Navajo Weaving: The Gloria F. Ross Collection of the Denver Art Museum (through January 8, 1997) Show explores the artistry of modern weaving.





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Highlights Continued

Recent currents in American art

Los Angeles-based performance artist and painter Gronk considers himself a kind of urban archaeologist, unearthing messages buried beneath the surface of city life. Drawing his inspiration from an amalgam of Catholicism, Latino folklore and Hollywood movies, he uses thick layers of high-intensity acrylic paint to create bold, expressionistic images.

Two of Gronk's works, including *St. Rose of Lima* (below), are featured in "American Kaleidoscope: Themes and Perspectives in Recent Art" at the National Museum of American Art. On view through February 2, 1997, the exhibition showcases the work of 14 contemporary artists. "In planning for this exhibition," says NMAA curator Jacquelyn Days Serwer, "I looked for artists whose work offered both visual impact and a message that said something compelling and universal about being an artist in America toward the end of the century."

New York painter Mark Tansey employs surreal juxtapositions to challenge our perceptions of truth and reality. Works by Kim Dingle and Roger Shimomura spotlight issues of gender and cultural stereotype. A two-part video installation by Pepón Osorio explores how social realities affect families in urban America. "Of the hundreds of great artists working today, we've selected a few whose art communicates directly to a broad audience," says NMAA director Elizabeth Broun. "Taken together, they reveal the various personal, social and spiritual impulses current today."
Diane M. Bolz

Using passages of flat, saturated color, Gronk casts his iconic female figure (La Tormenta), based on film star Ingrid Bergman, as the 16th-century's Saint Rose of Lima turning her back on incarnation of evil.

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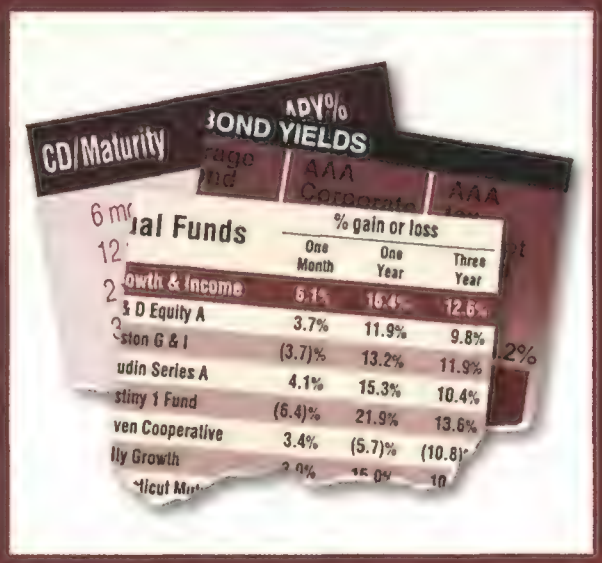

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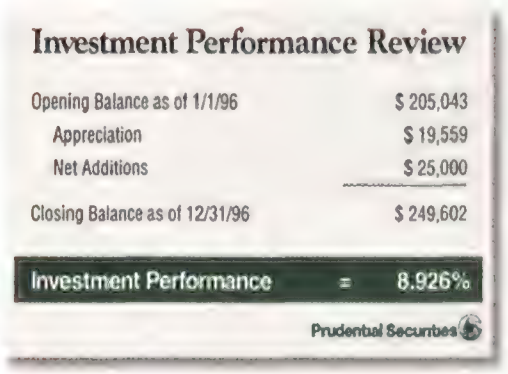
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What A Luxury Car Should Be

By Jeff Wheelwright

The berry and the poison

Methyl bromide makes our fields fruitful; it will soon be banned, however, not because it's toxic—and it's very toxic—but because it attacks the ozone layer

A Caterpillar moves across a California field, injecting a fumigant into the soil and covering it with plastic.

Photographs by Chad Slattery

At the annual Strawberry Festival in Santa Maria, California, the fresh fruit spills from the tables. Underneath the red-and-white canopy of the Strawberry Specialty Dessert Pavilion, not far from the "berried treasure hunt" and the pie-eating contest, you can sample, in any order you like, a strawberry fizz, strawberry parfait, strawberry cheesecake, strawberry kabob, strawberry burrito, chocolate-dipped strawberry and, of course, strawberry shortcake. You can also be a purist and eat your berries straight up, leaning forward slightly, pinky extended, so that the juice dripping richly from the fruit hits the ground and not your front.

You may then make your way, listing a bit, into the education hall. Here are booths displaying the latest in strawberry technology: the fertilizers, plastic mulches, tractor accessories and plant-science breakthroughs that have made California strawberries a national hit. Soon you will have a stuffed head to match your stuffed stomach. Did you know that California grows 80 percent of America's strawberries? This amounts to nearly a billion pounds a year, filling some 800 million pint-baskets.

After learning all you can stand about strawberry production, try taking the Berry Smart Quiz. The attendants give you a sheet and pencil at the door. Ten questions, multiple choice. Each booth's vendor has provided a question. Here's the one from Trical, an agricultural pesticide firm: Which gas helps farmers by killing harmful diseases in the soil?

A: Propane. B: Ethyl alcohol. C: Methyl bromide. D: Alka Seltzer.

If you select C, methyl bromide, you may return to the Dessert Pavilion for another round.

Methyl bromide is in fact what makes the strawberry festival such a huge event; it is the elixir of the entire industry. Injected into the ground prior to planting, it has effects that last the whole growing season. Penetrating pores and crannies, even the seed capsules of weeds, methyl bromide can take out most anything alive, from large rodents to nematodes to microscopic viruses. Long before fields in California were fumigated, an average acre of land produced a ton of strawberries. Modern cultivation methods boosted that to 5 tons. Now, thanks in large part to this extremely toxic pesticide, the average yield is 20 to 25 tons per acre, with yields of 40 tons common in some regions.

Much of the state's almonds, grapes and ornamental flowers also depend on methyl bromide. Across the country in Florida, more than 50,000 acres of tomato fields are treated every year with the gas. In Kentucky and the Carolinas, tobacco benefits from the compound's weed- and bug-killing potency. The fumigant

Jeff Wheelwright, a former science editor at Life, *wrote in the May 1995* SMITHSONIAN *on the political and technical problems of storing nuclear waste.*

In California fields like these, strawberries are still picked one at a time. But there is one big difference.

abets about a hundred crops in all, and not only in the fields. At cargo ports around the United States, fruits and vegetables worth hundreds of millions of dollars are treated with methyl bromide before being exported or imported.

The U.S. Department of Agriculture has estimated that up to $1.5 billion in revenue would be lost each year if methyl bromide were not employed. California calculates that its agricultural losses without the gas could exceed $300 million. Experts in Florida say their state is looking at twice that.

Note the change in emphasis. The manufacture and importation of methyl bromide is to be banned in the United States as of January 1, 2001; in the meantime, production has been frozen at 1991 levels. With the stakes so high, the controversy is already hot. Indeed, shortly before the strawberry festival in Santa Maria last April, methyl bromide survived a bitter battle in the State Legislature. Had the vote gone the other way, all sales of methyl bromide in the state would have halted.

The story of methyl bromide, of its wondrous rise and fated fall, is in some respects a familiar one. Since the publication of Rachel Carson's *Silent Spring* in 1962,

In the old days, an average acre yielded 1 to 5 tons of strawberries. Now it yields 20 to 25 tons and more.

health and environmental authorities have outlawed or restricted the use of many chemical pesticides for having harmed human health or for threatening to do so. Some pesticides were banned for their immediate effects, after farm workers or consumers of tainted produce became ill. Other compounds proved to be hazardous over time: they produced delayed problems like birth defects or cancer in lab animals.

Methyl bromide certainly has acute effects. In high doses it acts like a nerve gas. It has killed people. In low doses it may be a developmental toxin, if the findings from tests on pregnant rabbits and rats extend to humans. But these hazards have not blocked its use. The substance hasn't been shown to cause cancer, the public's deepest fear. But conclusive data may be hard to come by because, paradoxically, the chemical is so deadly. Scientists administering it to dogs, for example, had trouble keeping their subjects alive long enough for the effects of chronic exposure to arise.

The use of methyl bromide increased in the 1970s and '80s as other compounds earned environmental black marks. "Methyl bromide is at the end of a long series of fumigants that have come under fire," notes James Liebman of the Pesticide Action Network in San Francisco. The other compounds were called DBCP, EDB and 1,2-D. A fourth compound, known as 1,3-D or Telone II, was outlawed in California in 1990. It is now being allowed back on a limited basis. Today, the strawberry and tomato growers are fighting to keep methyl bromide because there are no good alternatives left, or so they claim.

Methyl bromide's great advantage over other chemicals is that it leaves no toxic residue in the soil. Yet it has fallen afoul of regulators because of an unusual environmental twist. According to the Environmental Protection Agency (EPA), the compound can cause cancer all right, but by indirect means. Having gassed its targets, methyl bromide escapes the soil and rises to the stratosphere, where its bromine atoms attack the ozone layer. The breakdown of ozone allows more ultraviolet (UV) radiation from the sun to reach earth's surface. More UV rays, in turn, mean more skin cancer for human beings.

By U.S. law, methyl bromide must go, not because it's too toxic but because it's been declared an ozone-depleting substance. The 150-odd countries that are party to the United Nations Montreal Protocol, a treaty that regulates such substances, have also acted against methyl bromide: globally, the chemical is scheduled to be phased out by the year 2010. Exceptions will be allowed, however, for its use in developing countries—which may give those countries an unfair advantage.

In pitting agribusiness against environmentalists and health officials, and involving politicians even to the level of President Clinton, the clash over methyl bromide is the latest and maybe the last in the war that began with Rachel Carson. Ironically, stopping the manufacture of methyl bromide won't end its story. The oceans and forest fires also produce the stuff, together injecting into the atmosphere perhaps twice as much as does human use of the fumigant. The oceans apparently now absorb and destroy at least as much methyl bromide as they emit, but the various natural processes at play are not well understood.

Berries grow best in redwood country

The heart of strawberry country is the concave belt of coastline around Monterey Bay, south of San Francisco. Redwoods used to tower over this dipping terrain before the trees were cleared in the 19th century. The area features summer fog, keeping the temperatures moderate, and sandy soil that is permeable to fumigation.

In the farm town of Watsonville you see large greenhouses set next to the strawberry fields. The greenhouses are nurseries for cut flowers and garden stock, and they, too, are important users of methyl bromide. It's instructive to get your first look at the fumigant at a

greenhouse, because you can watch the application up close, and also because the more mechanized operation that you will see later in the fields is trying to accomplish the same thing, which is to raise strawberries almost antiseptically, like greenhouse plants. Methyl bromide does not sterilize the growing medium, but it comes close.

One day in early June, Tim Akimoto, who works for Kitayama Bros. Nursery, and Mark McLaughlin, who dispenses methyl bromide for Trical, "shot" a greenhouse in Watsonville. McLaughlin had put through the paperwork the day before, alerting the county. In the morning he brought red-and-white signs saying "Danger" and "Peligro" (the Spanish translation).

Akimoto removed one of the corrugated fiberglass panels from the side of the greenhouse. In the opening he posted one of the warning signs. Beneath it he snaked a stainless steel hose, attaching it to a long plastic tube that had perforations for delivering the gas. The tube was laid flat upon the soil of a long, raised bed, and both tube and bed were covered in plastic sheeting, which would contain the gas while it prepared the ground for roses. Later, workers carrying their own air supply would lift the tarps, and ventilation fans would help the gas escape through the doors and windows of the greenhouse.

McLaughlin lifted a tank of methyl bromide from the back of a pickup. The metal canister looked like a small beer keg, or a large fire extinguisher. Indeed, methyl bromide was once used to put out fires.

Akimoto connected the stainless steel hose to the canister and then attached a propane heater to the line. Methyl bromide coming from the canister is very cold and penetrates the soil better if it is warmed up.

"You don't wear gloves and coveralls," McLaughlin commented. "You don't want to wear anything that will trap the gas. You want it to get away from you." Methyl bromide can deliver terrible burns. It is colorless and odorless, thus all the more dangerous. In modern formulations it is laced with chloropicrin, a kind of tear gas. The sting of the chloropicrin is meant to give notice that a more toxic substance is on the loose.

For all that, the two men were remarkably casual about the gas flowing silently into the greenhouse. McLaughlin looked up at the gray sky. "The fact that it rises so fast makes it safe for us to use." Less enthusiastically he added, "Of course, that's why it depletes the ozone layer, I guess."

Beginning in July, the orders come in to Trical from the strawberry growers around Watsonville. The fields must be fumigated prior to the fall planting. McLaughlin and his tractor crews get busier and busier. The best time to shoot a field is early morning, before the wind comes up and tugs at the tarps.

"This sandy loam was marginal farmland until berries came along," said McLaughlin. He leaned on his shovel. Clumps of fog scudded overhead. A bunch of swallows swooped and scattered as three small Caterpillars sped off in succession down the field.

At the back end of each vehicle were a series of injectors, which stuck 12 inches into the ground and literally plowed the field with gas. Simultaneously the tractor unfurled an 11-foot-wide strip of plastic. One edge of the plastic was pressed into the ground, while the other edge overlapped the previously laid strip and glued itself to the seam. Men ran along behind, shoveling extra dirt onto the tarp's exposed edges. The field looked like it was being gift-wrapped during a holiday rush. If so,

A tightly wrapped house is filled with methyl bromide to rid it of termites and other pests. Fumes could kill human intruders.

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Mark McLaughlin is surprisingly relaxed for a man who frequently works with an extremely toxic gas.

the present wouldn't be opened for five or six days, and then only gradually.

There were 76 acres to be "fumed" at this site, at the rate of 375 pounds of gas per acre, which McLaughlin called a "pretty healthy shot." The blend was 57 percent methyl bromide and 43 percent chloropicrin. As well as serving as a warning agent, chloropicrin is a pesticide in its own right, with somewhat different properties from methyl bromide's. So mixtures vary according to the fields' needs.

Was it possible, ten feet from the shimmering plastic, to be getting a whiff of the tear gas? Or did the faint odor emanate only from the power of suggestion?

"Put your head under that tarp and you'll smell something," said McLaughlin dryly, "like the strongest onions ever."

He doesn't joke when he's explaining the job to homeowners around the strawberry fields. Buffer zones are paced off and posted; the nearer the houses, the fewer the acres that may be treated in one day. If there happen to be residences located downwind and at a lower elevation from the field, McLaughlin particularly worries about a tarp ripping, because gas could escape and engulf the houses.

The California Department of Pesticide Regulation (CDPR) keeps a record of such incidents around the state. In recent years, houses and apartment complexes have been evacuated, and people taken to hospitals, when poison gas got loose. Conceding that there have been scores of injuries, pesticide proponents point out that no one in California in the past 15 years has died *because of an agricultural accident with methyl bromide.*

This is true. According to the CDPR, 18 persons have been killed by methyl bromide since 1982. Every fatality, however, is associated with structural fumigations, that is, using the gas to rid buildings of termites and other insects. Structural fumigation accounts for about 5 percent of this country's use of methyl bromide. Almost all the California fatalities have involved people who were intruding. Seventeen of the 18 dead entered the buildings illegally: some were transients or burglars, some had been drinking, some were residents who simply ignored the posted signs. But in one case, an apartment dweller died after he was told by the exterminator that it was safe to return. The exterminator pleaded guilty to manslaughter.

"Some people are terrified by it. They don't understand how I can work around methyl bromide," said Mark McLaughlin. "The community here is divided. The people who drive to their jobs in Silicon Valley [the computer hub, east of Watsonville] see the tarps and wish we wouldn't use it."

For the first time he sounded a little bitter. "Silicon Valley . . . All that farmland covered up by concrete."

A funny thing about methyl bromide. As you study its history and its uses, the chemical begins to fade, its fearsome reputation dispersing, until you understand that the controversy is basically one of economics. If soil fumigation is unavoidable, what are the costs of using methyl bromide? What will the cost be to replace it?

Keeping ahead of the competition

The strawberry business, like the fresh tomato and ornamental flower businesses, is a high-stakes, high-tech enterprise with growing foreign competition, yet the harvesting is still done the old way, by hand. The cost to bring an acre of strawberries to harvest can be $10,000, most of that for labor, but it includes some $1,500 for the fumigation. Growers get their money back only if prices and demand stay strong over the six-month harvest. This year an outbreak of intestinal illness in Texas was mistakenly blamed on California strawberries, and though the warning was soon retracted, the industry lost tens of millions of dollars.

Fumigation has become necessary for U.S. growers to remain competitive, in part because California is running out of farmland. In the old days, when a strawberry field was overtaken by pathogens, the grower moved the next year's crop to virgin ground. With subdivisions and shopping centers ringing the fields, however, and land prices climbing, it's not feasible to move. An acre of prime farmland in Watsonville sells for $25,000 and leases for about $2,000 a year. You bet the grower will squeeze all the fruit he can from a field, using the strongest fumigant available.

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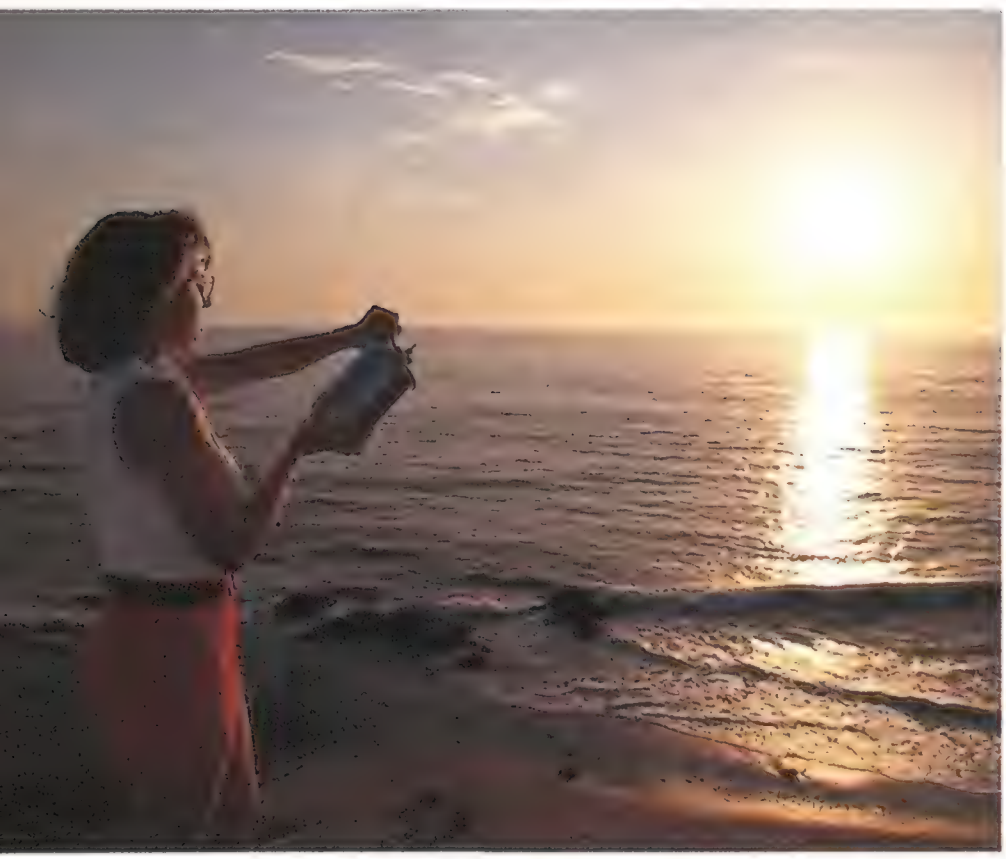
When today's strawberry plants are presented with nearly pathogen-free earth, a mulched bed, drip irrigation and fertilizers, they will produce more pounds of fruit per acre than almost any other fruit crop. Of course, the plant, too, must be clean—free of disease or pests—at the time it is put into the ground.

The wild strawberry is a perennial, propagating itself by runners, but the strawberry of modern culture is treated strictly as an annual. Each fall the grower buys new plants from a nursery. They are the fourth generation in a process that begins with cells in a test tube, each generation carefully cultivated and fumigated. Unlike their predecessors, they alone will be allowed to bear fruit. In late summer, as the ground around Watsonville is being prepared, the plants are developing in the cool volcanic soil of Northern California. They are still attached to last year's "mother plant" by runners. They will be separated and trucked south. The sudden rise in temperatures will cause them to behave as if it were spring, and over the winter they'll put out flowers and berries.

All this manipulation and transplantation would be impossible without reliable fumigation. The nurserymen, like the growers, cling to methyl bromide for their strawberries because they know it works. In a competitive and volatile business, any change in what works might turn a profit into a loss. "We know each plant by name," says Bill Reiman of Lassen Canyon Nursery. "Every plant of ours is inspected. It's a huge investment and we can't afford to lose even one to disease."



UC-Irvine graduate student Jody Williams takes an air sample to measure levels of methyl bromide.

The year 2001, when the U.S. ban is to take effect, is only four growing seasons away. The agricultural community is not so stubborn that it hasn't considered the alternatives. There are other soil treatments on the market, such as Telone II, metam-sodium, dazomet and chloropicrin. None is believed to be as good across the board as methyl bromide.

Research continues—a compound called methyl iodide looks promising—but an affordable new magic bullet is not likely to be approved by 2001. If methyl bromide is eliminated, growers may have to adopt new combinations of chemicals, and perhaps new practices of cultivation: more organic farming. Also, predicts Bill Reiman, "strawberry prices will rise, the market will contract and some growers will go broke."

The politics of methyl bromide

During a visit to California in September 1995, President Clinton met with a delegation of growers and was questioned about methyl bromide. Reportedly he said he would favor an extension of the deadline if no economically feasible alternative materialized. A bill granting the pesticide a reprieve was introduced in Congress last spring, but it didn't advance. Over the next several years the parties to the Montreal Protocol will debate the question of agricultural exemptions to the ban. Politically, things are in a state of suspense.

The agency most feeling the suspense is the EPA. It was the EPA that declared (after threat of litigation by environmental groups) that methyl bromide was an ozone-depleting substance and that, under the 1990 amendments to the Clean Air Act, production of the gas had to be halted. The legal definition of an ozone-depleting substance turns upon scientific complexities that won't be explained here. Let it be said that methyl bromide differs in several important respects from the chlorofluorocarbons, the infamous CFCs. These synthetic refrigerants were the first chemicals to be discovered chewing on the ozone layer, and all others are measured against them.

Methyl bromide destroys ozone even more efficiently than the CFCs do, but there isn't as much of it in the atmosphere. Moreover, it persists in the atmosphere for less than two years, not 50 or more like the CFCs and other chlorine-based compounds. Finally, as noted, there is a large natural source of methyl bromide, and a natural cycle of emission and removal, operating quite independently from the strawberry and tomato growers of the world. No one knows exactly how much of the overall ozone loss is due to man-made methyl bromide.

"But of the yet-to-be-banned compounds, methyl bromide is the most significant ozone-depleter," says Paul Stolpman, Director of Atmospheric Programs for the EPA. Still, Stolpman calls it "unfortunate" that the

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Frank Westerlund holds berries grown in untreated soil, left, and on land "shot" with methyl bromide.

Clean Air Act does not permit exemptions for essential uses of methyl bromide, as it does for the CFCs. "If and when the time comes, and if the alternatives haven't been found, we'd like to have that ability [to grant exemptions]. That doesn't mean we would use it. We have time. Technical advances are possible."

Frank Westerlund (above) is a plant pathologist for the California Strawberry Commission, which has conducted agricultural research for 30 years. Westerlund reserves his enthusiasm for the intricacies of soil ecology and the attributes of new breeds of strawberry. "We're coming closer and closer to varieties that can tolerate soil pests," he says, "but for now we still can't do without methyl bromide/chloropicrin."

The commission has test plots where Westerlund and other scientists, including researchers from the USDA, can experiment. One plot, a little more than an acre in size, had never been plowed. Since 1992, almost half of it has been used to compare chemical alternatives to methyl bromide. The soil is treated in one of four ways: with a standard blend of methyl bromide and chloropicrin; with chloropicrin and Telone II; with straight chloropicrin; and with no fumigation whatsoever. In 1995, new strawberry plants were put in, and the four sections of plants cultivated identically.

The results as of last summer? In one sense, it was like night and day. The fumigated beds were doing conspicuously better than the unfumigated beds. The plants in the latter were a little scraggly, and some had leaves that were brown and shriveled—"like the strawberries in the '40s and '50s," said Westerlund. "These are dying from verticillium wilt [a fungal disease]."

Whether they were expiring or not, it was the comparison that really hurt. For the strawberries in the treated beds looked like hydrangea bushes. They were huge. Their erect green trefoils were as broad as your hand, and the berries dangling from the thick foliage were the size of small pears, or more aptly, big rubies, plump and expensive. Below the plastic mulch the plants had sent down masses of roots. Westerlund said that large, disease-free roots, made possible by fumigation, reduced the plant's need for fertilizers over the season. Healthier plants also got fewer applications of other pesticides, an important consideration for the pickers in the fields.

Asked, however, whether the *type* of fumigation was making a difference, Westerlund said no, not that could be told from this test plot so far. Growth throughout the treated beds was pretty much equal. Didn't that suggest that methyl bromide wasn't head and shoulders above the other chemicals, Telone II and chloropicrin? Westerlund pointed out that at other test plots, where berries had been grown longer and the soil had built up pathogens, methyl bromide was proving superior.

After discussing the pros and cons of various alternatives, he waved his hands and exclaimed, "Nobody likes to fumigate! It's a hassle, it's a pain in the butt. These are highly toxic chemicals!"

He wasn't the first agriculturist to complain to me about chemicals. Nurseryman Bill Reiman frets about the increased risks from chloropicrin and Telone II following a ban on methyl bromide. Even Jennifer Curtis, who studies the issue for the Natural Resources Defense Council, says, "Most growers would like to reduce their use of chemicals. They're not spray-happy. Besides, who wants to wait for the next EPA regulation—the next time they take one of your tools away?" Curtis would have farmers move to organic methods, away from synthetic pesticides altogether.

"There hasn't been a systematic approach," said James Wells, director of the California Department of Pesticide Regulation. "We have to find our way out of this picking off one chemical at a time."

Methyl bromide may yet receive a pardon, but if the regulatory machinery cannot yield, here's a radical suggestion (which admittedly ignores certain complexities). Everyone should stop using methyl bromide at once: both the farmer over the hill and the farmer over the border. If the stuff has got to go, it should be by universal disarmament. No one gains an advantage, the markets adjust, and the ozone layer gets a reprieve.

Bountiful harvests such as this may be history if the fumigant is banned in the United States in 2001.

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What's new in your world?

By Verlyn Klinkenborg

It's 10 below, and the ice is 3 feet thick, so let's go fishing

Seriously. Take plenty of bait, don't forget your bucket and stay warm. You might catch a walleye. You could even win a prize

Winter comes, the ice thickens in the long, bitter nights, and soon the ice-fishing houses are towed out of the storage yards and onto the lake. In a good year there are, all told, perhaps a dozen weekends of fishing between the onset of deep ice and the end of February, when the houses must be towed off the lake again. But 1996 has not been a good year. It has been a freak year, the kind of winter, where Minnesota anglers are concerned, that comes only once every decade or so. In mid-January, a storm dropped a foot of new snow in the north central part of the state. Brutal cold they're used to here, near Brainerd, two hours north of the Twin Cities: highs in the low teens, lows so low you hope the weatherman means Celsius. But this much snow at once is unusual. And east of Brainerd on Mille Lacs Lake—the second largest lake in a state full of lakes—the resort owners are pulling ice houses ashore as fast as they can

Walleyes, like huge replica (left) at Mille Lacs Lake, are ice fishermen's prime quarry; a spear fisherman (above) readies weapon over decoy set to lure pike.

only midway through the season, during a week when the high will barely exceed zero.

Here's the problem. All across Mille Lacs, which is 200 square miles, the ice is three feet thick. That adds up to some 17 billion cubic feet of ice. A cubic foot of freshwater ice weighs about 50 pounds, which means that the ice on Mille Lacs weighs roughly 850 billion pounds. In large-mammal units, that is the equivalent of a herd of 53 million mature African bull elephants. Though the ice forms a thin sheet compared with the lake's surface area, all of that weight is pressing downward on the dark body of water beneath, as it does in any normal winter.

Now add snow, a total of two feet by 200 square miles. Because the moisture content of snow varies widely, it's hard to say how much that much snow weighs. Call it a lot, perhaps as much as 348 billion pounds. Imagine 22 million elephants walking onto the lake. The snow presses down on the ice, which is already burdened with more than 5,000 ice houses and with anglers and their vehicles, mostly pickups and snowmobiles. Don't forget the beer and schnapps they bring, and the food and tackle and generators and extra socks, not to mention the fish they've caught, now lying stiff and dry-eyed in the snow. If you drill through the ice under these extraordinary conditions, water will flood upward out of the hole and onto the surface. And so it happens that out here, where the ice is a yard thick and the temperature two nights ago was well below zero, there are shanties flooding with water.

More snow is forecast. There is a real danger of the ice failing under the load from another storm. Already a major crack parallels the western shoreline along St. Albin's Bay. All this is very strange, and it grows stranger

Photographs by Ted Wood

the more you think about it. That's how you know you're in walleye world. That's how you know you're ice fishing.

"This is a behavior that's unique," says Bob Michael, who is standing with his wife and young daughter on a pressure ridge nearly three miles out from the east shore of Mille Lacs Lake. They are looking at their fish house. The wind is cutting, the afternoon is growing long, and this house, a simple box about 10 feet wide by 20 feet long, looks as though it began to sink then changed its mind.

"The house is high-centered," Michael says. "There's probably 20 inches of ice now above the original surface from flooding. Wouldn't be a big deal, but we got five weekends of walleye fishing left." Last winter, Michael, who comes from Princeton, Minnesota, and until recently wrote mortgages for a living, looked out the window of his fish house in the night and saw a neighbor's fish house burning down. Last winter, his wife drove their pickup across a 12-inch crack in the ice. These are just some of the things he means by "behavior."

"It's a suburb of shanties"

Ice fishing may be a bizarre sport, but many of those who enjoy it go to great lengths to make it seem ordinary. Bob Michael's high-centered house, teetering on its fulcrum of ice, stands at the end of a cul-de-sac in a neatly organized subdivision of ice-fishing houses, each with the name and address of the owner painted on its side. It's a suburb of shanties. And yet the word "shanties" is misleading, at least on Mille Lacs, for there are houses in this subdivision on which Bob Michael might well have written a mortgage, so elaborately are they furnished and appointed.

Looking westward from where we stand, there's almost nothing in sight, only the dim arctic glowering of gray cloud on dull snow. It's easy to pretend that the top of the world lies somewhere out there in all that blankness. But looking toward the dark line of the near shore, I can see dozens, perhaps hundreds, of houses, each with a driveway plowed out of the snow, each with a hollow behind it, a wind-shadow where snow did not drift in the recent storm.

Above the thin roar of the wind, I can hear the sound of a pickup truck, one of a crazed, half-derelict fleet that work the winter season on the ice. The truck is towing a fish house onto the broad, plowed road that leads to shore and to the safety of the storage yard behind the Lakeside Resort. Where packed snow covers the road, the chain between truck and fish house stays taut. But when the driver reaches glare ice, the house suddenly accelerates, slips sideways on its skids, seemingly intent on passing the vehicle that is pulling it.

Driving out onto the lake that afternoon along a glass-hard, nearly frictionless freeway of ice, I found myself

Fish houses (above) are laid out like a subdivision on Mille Lacs Lake, where (below) a cozy solar-powered unit with TV (top left) competes with a futuristic model

(bottom right); two fisherman clear a path to an old four-hole trailer (top right); and a third (center left) jacks up a flooded six-holer to move it to drier ice.

imagining the summer world of Mille Lacs: no ice, no fish houses, just open water, a low hum on the breeze—the sound of outboards in the distance—the oily warmth of a Midwestern lake summer. I remembered ice fishing as a boy in a frail, tar-paper shack that seemed to have been designed to keep the light out and the cold in. There was barely room for two adults, a boy, and their tackle. That shack stood on a small Iowa lake, and the fishermen there had grouped their shelters haphazardly, with little sense of territoriality, just an unexpressed yearning to keep each other in sight should the ice groan or the beer or coffee run low.

Driving past the rows of fish houses on Mille Lacs, I found myself thinking, too, about Henry David Thoreau. With borrowed ax and the boards from an Irishman's shanty, he built a house that measured 10 by 15, smaller than many a Mille Lacs fish house. If Walden Pond hadn't been shorn of its ice by "Hyperborean" icecutters every winter, Thoreau might have towed that house out onto the pond, cut a hole with his borrowed ax through what he called the skin of Walden, and fished in splendid isolation for the pickerel of his fancy. He might have written truly of his ice hole, as he did of his root cellar, that "the house is still but a sort of porch at the entrance of a burrow."

But no one cuts ice holes with axes anymore. Most Mille Lacs anglers use a power auger, a giant corkscrew with a lawn-mower engine mounted on top. It takes only a few minutes to bore an eight-inch-wide hole in three feet of ice, and when the auger breaks through there's an uprush of water. And though splendid isolation can be found on Mille Lacs, especially during the middle of the week and in the day or two after a major snowstorm, getting access to it is more highly structured than a casual observer would ever guess.

"Do Not Drill Holes in the Roads"

I stopped one morning at Richie's Launch and Guide Service, a low-key fishing operation on the west side of the lake, just ashore from the north end of the crack dividing the ice in St. Albin's Bay and just a short drive from the giant walleye—a totem of angling success—that beckons to anglers from the waterfront park in Garrison, Minnesota. Across the highway from Richie's, a driveway leads down onto the ice, where a sign lists road-use fees. It had never occurred to me that a road over the ice could be proprietarily held, but so it is, largely because the crew at Richie's works very hard to keep it clear of snow. At Richie's, you can buy "King Tutt's Mille Lacs Walleye Whiffer Lake Map," which Brian Crenna, who was on duty that morning, calls "the best map that was ever made." Or you can use a photocopied map to find your way. This map says, in bold letters, "Please Do Not Drill Holes in the Roads."

Reclining on his bunk, Jim Mackenthun converses with pals while enjoying a weekend of fishing in the swanky eight-hole shanty he built himself. Located a couple miles offshore, it offers all the comforts of home.

During the summer, a lake fisherman usually tries to position his boat near what is called "structure," which, on Mille Lacs, means one of several dozen named mud flats rising some 6 to 10 feet above the otherwise undifferentiated floor of the lake. (Mille Lacs Lake is about 40 feet deep in its deepest spots.) Fish gravitate to structure. I asked Brian Crenna how he knew where to place the ice houses once the lake froze over. I had naively imagined him eyeballing it, using a surveyor's chain or a compass and the odometer in a pickup truck. "GPS," Crenna said, referring to the handheld satellite navigation devices that have proliferated over the past couple of years. Their appeal to anglers is obvious: they allow you to orient yourself precisely even on a featureless body of water. Because it's one of the most popular fishing lakes in Minnesota—and because there's nothing a walleye angler likes so much as more electronic gear—Mille Lacs Lake is one of the better charted places on the face of the earth.

The terrestrial coordinates for Seguchie Flat, a hot perch-catching area five miles out from Richie's, are 46 degrees 15.36 minutes north latitude, 93 degrees 43.30 minutes west longitude. To have your fish house towed out to Seguchie Flat and to store it in Richie's houseyard during the off-season, where it doubles as a tax-free summer cabin, costs $375 (which includes the road fee) if your shanty is smaller than 10 by 16. If you'd rather rent an ice house, it will cost you $180 a weekend for a four-hole house, $260 for a six-holer. Nearly 40 resorts, bait shops and marinas offer some sort of ice-fishing service on Mille Lacs Lake: anything from hole drilling to road and ice-house maintenance.

When the January snowstorm hit, it brought business to a standstill. The resort owners plowed night and day, but they couldn't get their customers onto the ice. "We canceled all our reservations for the weekend," said Brian Crenna. Down the road, at Twin Pines Resort, more than a hundred people waiting to get to their fish houses gathered in the 12-seat bar the Friday night after the storm, while Linda Eno, who owns Twin Pines with her husband, Bill, poured drinks and talked to the plow crew—working far out in the icy gloom across Highway

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169—by two-way radio. And all of this for a sport in which the very best advice you can get—besides "stay warm"—is the headline printed on January 21, 1996, in the sports section of the Brainerd *Daily Dispatch*: "Try Swedish Pimple, Weasel with Fathead."

There's a persistent rumor around Mille Lacs about the fish house with a hot tub. "Yeah, I hear there's one on the other side of the lake," fishermen say, no matter what side of the lake they're on.

That rumor is a little like the one about anglers who actually eat eelpout. An eelpout, also called a burbot (and having the lovely Latin name *Lota lota*), is a deep-dwelling relative of the cod that looks like a blind alley in evolutionary design. The eelpout is roughly tubular in shape, with a sullen, disappointed expression, an elongated, eel-like body, and long dorsal and ventral fins. It is most active, not surprisingly, at night. To catch an eelpout from an open boat in the middle of summer with the stars shining overhead must be shocking enough. But to haul an eelpout through a hole in the ice onto the shag carpet of your fish house in the dead of winter must be like beaching some hideous desire. "They're prehistoric," said a man named Terry, who was helping out at a local bait shop. "Been around for millions of years. Ugly. They call it 'poor man's lobster.' I've never had it. I won't touch 'em."

In fact, the eelpout rumor is true. In Joe Fellegy's *Mille Lacs Fishing Digest*, a seasonal angler's guide, there appears an endorsement of eelpout, if not an actual recipe: "For frying, deep frying, broiling, or boiling, we prefer the forward portion of the pout, but we have no biases against the tail either!" And, as it happens, the hot-tub rumor is true too. Off the south shore of Mille Lacs Lake, not far from the town of Onamia, there's a 20-hole party house, run by Izaty's Golf & Yacht Club, which will provide a hot tub on request. After hearing the hot-tub rumor for the sixth or seventh time, I decided that there's something oddly unimaginative in it, as there is in the persistent rumors about fish houses with large-screen TVs and digital satellite dishes. To predict that the comforts of life on the ice will increasingly resemble the comforts of life in suburbia is to predict the merely inevitable.

Of course, many anglers practice a less pampered version of the sport. On the Lakeside Resort ice-road, about two miles out, I saw a car pulled over beside a snowbank left by a plow. Three men had drilled a hole in the road behind their car and erected a tip-up, a tiny fishing rod with a spring-loaded flag that pops up when a fish takes the bait. Then, to judge by the lolling of their heads, they had climbed back in the car and asphyxiated themselves. They looked like dead men fishing in a puddle. On the ice near Barnacle Bill's, the northernmost resort on Mille Lacs, I saw several fishermen sitting in individual canvas ice houses that retracted like the clamshell top on an old convertible. I visited two anglers who were fishing through the floor of an ancient yellow house trailer with a dropped suspension. There was a flooded fish house flying Old Glory and the POW/MIA flag, with a cellular phone antenna mounted over the door, while in the distance a bald eagle skimmed the ice.

And everywhere there was a profusion of home-built shacks, each one a rectangular fantasy of plywood and chipboard and scrap paneling. Some neighborhoods were so entirely jerry-built that they looked like a convention of outhouses or a Hooverville from the Great Depression. But that's the appeal of a fish house. There's a peculiarly American pleasure to be had from cobbling together a dwelling out of found wood, making a habitation of almost nothing. (Consider Thoreau, who built his house for $28 and change.) It's a truly national expertise, a remnant of our history as settlers, a virtuosity now preserved largely on frozen lakes.

Still in pajamas, Linda Eno nibbles junk food while trying to hook something more nutritious for breakfast.

A fur-hatted contestant in an ice-fishing "extravaganza" registers his catch, a big walleye, at the weigh-in counter.

On the ice out from Richie's, somewhere over the edge of Sliver Flat (about 46 degrees 16.57 minutes north longitude by 93 degrees 45.83 minutes west latitude), I stopped one morning at an ice house owned by Jim Mackenthun, a fair-haired young farmer from Glencoe, Minnesota. As I pulled up, a tullibee flew out the door and landed in the snow. The tullibee (*Coregonus artedi*) is also known as the lake whitefish. Unlike the eelpout, the tullibee actually looks like a fish. There is no limit on tullibee at Mille Lacs Lake. Some people smoke tullibee and eat them. Others smoke them and throw them away. Some people fill five-gallon plastic buckets with tullibee—ice fishing is a sport that would not exist without five-gallon plastic buckets—and throw *them* away. There are at least four classes of fish in Mille Lacs Lake: fish everyone eats, like walleye and perch; fish some people eat, like tullibee; fish no one admits eating, like eelpout; and fish you accuse others of eating, like carp. "Carp's considered a delicacy in Iowa and Nebraska," one Minnesotan told me.

Outside Mackenthun's fish house, which is one of the nicest on Mille Lacs, a generator was running in an enormous cardboard box on the snow, and a thick yellow extension cord snaked its way toward an outlet on the side of the house. The temperature was 7 or 8 below zero, and the wind was beginning to rise. Inside Mackenthun's fish house, five young men were fishing in bare feet. The temperature was probably 70 degrees at floor level and 90 degrees at the ceiling, despite the fan whirring overhead. At either end of the fish house, which is 10 by 22, stood a pair of bunks. At one end was a small galley—a stove and a carbon-monoxide detector—and at the other a small closet. A couch had been placed against one of the long walls and a table had been placed against the other wall. A radio on the table was tuned to a country station. The interior had been wainscoted with bead board and wallpapered in a pattern of trout flies. The floor was carpeted and eight holes had been cut in it, over five of which groggy, unshaven faces were now poised, staring downward into the indecipherable green.

A fishing hole next to the bed

Jim Mackenthun, who built this ice house himself last summer, occupied the master bunk. He was able to fish from bed.

"You know," said Mackenthun, "when you say you're going up to Mille Lacs and you're sleeping in a fish house, a lot of people don't understand."

"They think it's a sawdust floor and a bunch of guys smoking cigars and spitting on the floor," said Mackenthun's friend and fellow farmer, Rick Rehmann.

That morning, the Mackenthun fish house was a soporific place. It had been a long night. Much pepper water had been drunk, and as one of the anglers remarked, "There was a snaggletoothed bullfrog in here last night." With the morning light, Mackenthun and his friends had opened their first beers and baited their first hooks. Conversation sloped away until Al Artmann, who owns Al's Sports Bar in Glencoe, hooked a tiny perch. "He's a killer. He's a killer," said one of his buddies. "He's a banana," said another. "He'll fill up the corners of a round pan," said a third. Artmann unhooked the perch and released it, making sure it slithered back down through the ice hole.

The next fish was a tullibee.

"Tulli? Tulli?"

"The Cisco Kid strikes again."

"Grab him by the ears there, Rick."

"Now he's going outside," said Rick Rehmann. "Hitting the deep freeze. Ready for the smoker. Just gut 'em and smoke 'em. You don't put 'em on the carpet, that's for sure. They stink."

The door opened and the tullibee flew into the punishing light.

Four of the five anglers were fishing mostly by feel, partly by sight, looking down their lines until they faded out in the depths below. Rick Rehmann was using a depth finder, which sat on the ice below the raised floor of the fish house. A transducer hung in the water just

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beneath his hole. The depth finder has a dial mounted on a square housing, and the dial translates the lake bottom, the angler's lure, and the passing fish into trembling green and red dashes. "See that green mark that's coming up right there?" Rehmann asked me. "That's my jig." Fishing with a depth finder looked to me like trying to navigate around town by staring at your speedometer.

You hear a lot of jokes about ice fishing, which nonanglers sometimes call "ice drinking." I had heard a story, perhaps fictitious, about two men who drove out onto the ice before the big January snowstorm, knowing they would be stranded for days. When the plow finally reached them, their only words were, "More minnows and more beer." From Jim Mackenthun and his friends I heard a true story about a spear fisherman who fell through the spear hole he had cut in the ice on a lake near Glencoe and drowned. "He was lit, though," Al Artmann said. "They found him 20 yards away from the hole. The hole was 2 by 3, so he had to hit it just right."

But everywhere I went on Mille Lacs, including the Mackenthun fish house, people were fishing earnestly, whether they were drinking root-beer schnapps or black coffee. Many of them were fishing so intently that they seemed to have succumbed to a kind of ice-house hypnosis, to have dived down a private ice hole in their minds. When they looked up to talk to me, they had a long-distance stare that came from trying too intently to focus on something that wouldn't come into focus, some indeterminate depth in the water beneath them where their fishing line trailed off into oblivion. Somewhere down there, over the mud flats, swam the walleye of their dreams, the eelpout of their nightmares.

The largest concentration of ice anglers I saw was on Gull Lake, just a few miles northwest of Brainerd, perhaps 30 miles from Mille Lacs Lake. It was the Saturday morning after the big storm, the day of the sixth annual $100,000 Ice Fishing Extravaganza. The low the night before was minus 30, and the high that afternoon would be plus 5 degrees. Fahrenheit. Since daylight, a parade of anglers and their friends had lumbered onto the ice, their movements hindered by heavy clothing. They arrived from the parking area along the east side of Gull Lake in bus loads, and as they trudged across the ice—heading toward two enormous inflatable beer cans—they dragged behind them plastic toboggans full of gear: depth finders, rods, propane heaters, thermoses, five-gallon plastic buckets, perforated dippers for spooning ice from their fishing holes. They brought bait: shiners, rainbows, fatheads, wax worms.

By the time noon had come, and with it the official start of the contest, nearly 6,000 people had crowded onto the section of Gull Lake that fell within the judges' ken, where, on Friday, the Brainerd Jaycees had drilled 10,000 holes. To keep things fair, no one was allowed shelter of any kind. Luckily, there was not a breath of wind. Some anglers chose holes where the water might reach 65 feet deep—eelpout country. Others preferred the shallows. You could win by catching the biggest fish, but the first 100 anglers with any fish larger than eight ounces would win a five-gallon plastic bucket full of tackle. The angler who caught the hundredth-largest fish would win a new pickup.

As the clock edged toward starting time, the PA system blared out oldies broadcast by a local radio station. Some of the crowd, the serious contestants, dipped the ice from their holes once again and rechecked what anglers like to call their "terminal tackle." But the rest of the crowd, wearing snowmobile suits and blaze orange hunting coveralls, started dancing to "Y.M.C.A." by the Village People. At noon a shotgun blast went off, and the contest began. Anglers dropped their lines into the water, and within moments one fisherman near me stood up and began to run over the drifted snow toward the weigh-in tent. Soon there would be a line of men, women and children waiting to weigh their fish.

As for me, I tried to imagine the scene from the walleye point of view. It was unusually dark below the ice because of all the snow that had fallen the week before. There was a strange rumble overhead, and then there were those ten thousand points of light penetrating the unaccustomed dimness. Suddenly, down every luminescent column there came a hook, flashing silver, gold, chartreuse. The water was threaded vertically in every direction, and one was suddenly surrounded by the scent of wax worms, by the odor of shiners, rainbows, fatheads. It was beautiful, at first, but then, at last, it was all too sadly irresistible.

Enjoying a day at the lake, an angler relaxes on his five-gallon pail, the indispensable ice-fishing accessory.

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By Richard Conniff

What's in a name? Sometimes more than meets the eye

Jokes, puns, even insults—when it comes to deciding what to call newly discovered species, scientists don't always go by the book

Illustrations by Lane Yerkes

People who become zoologists generally do so in the face of sober parental warnings that their earthly rewards will be few and mostly of a dubious nature. And the parents, bless them, are dead right. You get a hint of this over lunch one day at the National Museum of Natural History (NMNH) when a researcher remarks with pride and ruefulness, "I've had two dung beetles named after me. And a louse."

It isn't the sort of thing a proud mother can hang on her wall, is it?

Among zoologists, having colleagues name a new species after you is what passes for immortality. But it can be an occasion for dread more than joy. Entomologist May Berenbaum became apprehensive after she discovered a new species and passed it on to an expert at the Smithsonian. "The last thing I need," Berenbaum fretted, "is for a beetle whose distinguishing feature is a proboscis fully half the length of its body to be known as Berenbaum's weevil."

The sort of animals most people would dream about having for namesakes—a gazelle, say, or a mountain bluebird—were taken long ago. New species nowadays tend to be invertebrates. In other words, you can still get your name put up in scientific lights, but mostly on the backs of strange, small creatures that the unenlightened public regards as, well, vermin. The good news is that, at least for now, there are lots of these creatures to go around. A Smithsonian researcher named Terry Erwin has taken extensive samples of ants, beetles and other life in the tropical rain forest canopy and demolished the old estimate that there are 1.5 million species on earth. He figures that there are actually more like 30 million, almost all of them insects in need of names.

This is a daunting nomenclatural challenge. Erwin has 1,500 species ready to be named just in his narrow specialty of ground beetles of the genus *Agra.* He once called a difficult species *Agra vation* and another *Agra phobia.* A colleague, Arnold Menke, gave a genus a name giddy with the elixir of discovery, *Aha.* (One of the first species was even giddier, *Aha ha.*) But since there were already 8,000 known species in his specialty, the sphecid wasps, Menke also threatened to name his next such discovery in a scientific paper titled "*Ohno,* another new genus of sphecid wasp . . ."

Menke is the recording angel of offbeat zoological nomenclature. Until his recent retirement, he worked for the U.S. Department of Agriculture (USDA) in a fourth-floor office at NMNH and kept what appeared to be

The discoverer of a beetle with a big nose didn't want to be the namesake.

the business card of a Bulgarian rug merchant on the door:

Vyizder Zomenimor
Orziz Assiz
Zanzer R. Orziz

Repeat this two or three times. If you get the joke, you may have missed your true calling: creating the sort of bizarre scientific names Menke has collected over the years. Among them are a fly named *Phthiria relativitae* and a spider named *Draculoides bramstokeri,* a pair of musical chiggers in the genus *Trombicula* named *doremi* and *fasolla.* (OK, you didn't get the joke. It's actually one of the world's last great unsolved zoological and philosophical mysteries: "Vy iz der zo many more horse's azziz . . .")

Naming new species is a serious business, of course, and the rules are complicated enough to fill 338 pages of the *International Code of Zoological Nomenclature.* But they boil down to just about the same system of scientific classification that the Swedish botanist Carolus Linnaeus first devised in the 1750s. Every plant or animal must have two names, a genus identifying the group to which it belongs and a species to distinguish it from other members of the same genus. These names are usually constructed on Greek or Latin lines. But Linnaeus wasn't trying to turn the biological world into an outpost of Eurocentric cultural imperialism. He merely wanted scientists to agree on one universally accepted name for every species to avoid befuddling one another with a vast array of different local names.

Linnaeus left plenty of room in his system for scientists to coin names from almost any multicultural phenomenon. Menke and his colleague David Vincent have named wasps *Polemistus chewbacca* and *P. yoda,* in honor of two well-known extraterrestrials. Likewise, there is a fish called *Zappa confluentus* named after Frank Zappa; a fossil turtle genus *Ninjemys,* named after that totally rad, fearsome foursome, the Teenage Mutant Ninja Turtles; and a crustacean genus *Godzillius,* named after Godzilla.

Smithsonian biologist Clyde Roper (SMITHSONIAN, May 1996) once named a whole family of squid Batoteuthis, from the Greek *batos,* meaning "thornbush," because the squid has a long, thornlike tail and large, bushy clubs. But this was also the middle of the Batman craze, and if you look closely at the illustrations accompanying Roper's article in a learned oceanographic journal, you may notice a tiny bat of unknown species flying out of the squid's oviduct. (Roper protests that he thought the editors would white it out.)

"Scientific names have much in common with crossword puzzles," a lepi-

The insulting name of one animal means "Holland is a terrible pig."

Dicrotendipes thanatogratus is named for the Grateful Dead.

An insect was *not* called *corpulentis* to mock a rival.

dopterist writes, and if the person coining a name "can mystify his fellow entomologists, he will derive sadistic pleasure in so doing." Hidden meanings are commonplace. For example, the formidable *Brachyanax thelestrephones* translates as "little chief nipple twister." The originator, Neal Evenhuis of Hawaii's Bishop Museum, says it has something to do with the shape of this bee fly's antennae.

The fly called *Dicrotendipes thanatogratus* comes from the Greek word for "dead" and the Latin word for "grateful" and was coined, in 1987, by an entomological Deadhead. Other names damn while seeming to praise. *Dinohyus hollandi*, for example, is a small, extinct species named for W. J. Holland, who was director of the Carnegie Museum and a popular writer on moths and butterflies. But Holland apparently made some enemies, because the name, loosely translated, means "Holland is a terrible pig." A more broadly misanthropic urge also sometimes seems to take hold of a scientist, as when Menke named a wasp species *Pison eu*. There is also a snail called *Ba humbugi* and a chigger named *Trombicula fujigmo*, the latter to commemorate a slang term once common among American soldiers being sent home at the end of World War II. If you had never heard how G.I.'s really talk, you could translate the acronym "fujigmo" as "Fie on you, Jack, I got my orders."

There are scientists who frown on such shenanigans. As Menke stepped out of the elevator one day recently, a colleague remarked that in his days as a journal editor he never allowed odd scientific names. "I thought they lent taxonomy to ridicule," he added dourly. Menke shrugged and said, "Some people don't have any fun."

People like Menke, a boyish 62-year-old with a gray beard and long hair swept back over his collar, spend most of their careers hunched over microscopes. Their job is to distinguish between obscure but almost identical insect species on the basis of body parts most people have never even heard of—the clypeus on a wasp's face, say, or the epandrium on a horsefly's behind. For the most part, they confer dutifully descriptive names, like *longicornis* (long antennae) or *megacephalus* (big- or maybe fat-headed). They publish their results in respectable scientific journals to be duly noted by the world's three or four other experts on bees' knees.

Yet they love their work, these humble taxonomists, and every once in a while a wild impulse of delight drives one of them to fling off the fetters of convention. On the brink of his retirement, for instance, a USDA wasp guy and Menke pal named Paul Marsh published a paper naming one species *Verae peculya*, another species *Heerz tooya* and another *Heerz lukenatcha*.

Sometimes thoughts of love inspire a taxonomist, as when the English entomologist George Kirkaldy named several genera of bugs *Peggichisme* (or "Peggy kiss me"), *Polychisme*, *Dolichisme* and, a little too ardently, *Ochisme*. Carl Heinrich, who was a USDA lepidopterist in the first half of the century, once told an entire short story in scientific names. In 1923, he called a genus *Gretchena*, after a woman with whom he presumably was involved. Heinrich went on to name species *Gretchena delicatana* (delicate), *dulciana* (sweet), *amatana* (beloved) and *concubitana* (possessed). The tale ended sadly with *Gretchena deludana* (deceived).

Curious scientific names also played a role in some sleuthing undertaken recently by Marc Epstein, a lepidopterist at the Smithsonian, and Pamela Henson, who is the Institution's historian. They were researching the life of Harrison G. Dyar jr., a Smithsonian entomologist early in this century. Dyar is remembered, officially, for having propounded something called "Dyar's law of geometric growth" and for bringing more precise standards to entomological taxonomy. Unofficially, he is celebrated for a life of bugs, bickering and bigamy. Epstein and Henson first tracked down one of the most cel-

Richard Conniff wrote about Uncle Sam's auctions in the October issue.

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ebrated myths in zoological nomenclature, that the quarrelsome Dyar named a species *corpulentis* after an obese rival, and that the rival in turn retaliated by naming a moth species, in his honor, *dyaria*. Sadly, the tale is false: Dyar seems to have done plenty of nasty things to the rival in question, but he never named a species *corpulentis* after him. The genus name *Dyaria* was coined by a New York banker who simply suffered from a tin ear. He was an amateur lepidopterist and cited Dyar as his "faithful co-labourer and friend," apparently under the impression that he was paying him an honor.

But as Epstein and Henson researched Dyar's life, they began to discuss another moth species that Dyar had named *P. wellesca*. It reminded them of "tales more lurid in nature." For years odd rumors had circulated around the Smithsonian that Dyar had a second family, that mysterious tunnels connected his two homes and that his bigamous deception fell apart when his children from both families discovered at a high school function that they shared a father with a passion for insects.

According to Epstein and Henson, Dyar did indeed own the house next door to the one where he lived with his first wife, Zella, and their children, but he used it mainly for rearing moth and mosquito larvae (and possibly also for getting away from his mother-in-law). His third house, however, was home to his spiritual adviser, Wellesca Pollock, whom he married in 1906, apparently under an assumed name. But this house was blocks from Zella's and no tunnels connected the dwellings. According to Epstein and Henson, digging tunnels aimlessly was merely "an eccentric hobby" for Dyar, who seems to have enjoyed a superabundance of energy. Oddly, considering his ability to quarrel with almost everyone else, Dyar seems to have maintained warm relations with both women and their five children. He came up with the name *P. wellesca* in 1900. In 1927, perhaps in the interest of taxonomic and romantic balance, he named a species *zellans* after his first wife, whom he didn't divorce until 1916. Epstein says Dyar also named species for "zillions" of other women along the way.

None of this seems terribly surprising, when you remember that scientists, too, belong to that most hapless of species, *Homo sapiens*.

Linnaeus himself seems to have understood the human knack for folly. He created the Linnaean system to bring order and harmony to the biological world—but one of the first species he named was *Chaos chaos*.

Zappa confluentus

Ba humbugi

Draculoides bramstokeri

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By Helen Dudar

From darkness into light: rediscovering Georges de La Tour

Long forgotten after his death in 1652, he is now embraced by the French as an icon; an exhibition touring this country shows why

It is one of the gnawing anomalies of art scholarship that Georges de La Tour was "lost" for nearly three centuries and yet with us all the time. Year after year, his luminous paintings could be seen in public and private spaces in France and England, wearing labels identifying them as the work of Murillo. Or Ribera. Or Velázquez. Or Rembrandt, the Le Nain brothers and, inevitably, Caravaggio.

La Tour died in 1652 and, in no time at all, so did his reputation. Although he had spent most of his working life in France's northeast province of Lorraine, his art had found favor with such imposing figures as Louis XIII and Cardinal Richelieu. The king had honored him, and the records of his hometown had identified him as a "famous painter." Still, fashion in art can be as fickle as a king's preference in courtiers. There was no room for La Tour's austere, intense imagery in an age that festooned France with the undemanding charm of Versailles rococo. The name, the fame, vanished into a nearly total, extremely long eclipse.

It would not end until well into our age, when the scholarly brotherhood began to look hard at some questionable attributions and to burrow through the rich archives of La Tour's home province. By 1934, enough La Tours had been identified—actually a meager dozen—for the work to be shown in a group exhibition of "Reality Painters" in Paris. The event was electrifying—an offering of mysterious, beautifully wrought, hypnotically still pictures that hardly resembled the erroneous labels they had once worn.

The public was introduced to blind hurdy-gurdy players, beggars, flaunting all the miseries of street life but somehow touchingly dignified; to groups of figures looming so large over the foreground that, to our modernist age, the arrangements appeared geometric, a 17th-century forecast of Cubism to come; to scenes aglow in the light of a single candle and deeply spiritual, while the expected symbols of veneration—halos, wings, a cross—are oddly lacking.

Nearly 40 years would go by before the first major one-man La Tour show in history arrived in Paris in 1972. By then, there were 32 identified pictures, and enough of them were displayed to provide a memorable sampling of the range of a dazzling talent.

And now, this country has its turn at Georges de La Tour. The first full-scale American exhibition of his work opened early in October at the National Gallery of Art in Washington, D.C. and will be in place until January 5, 1997. Then the pictures travel to the Kimbell Art Museum in Fort Worth, Texas, for a run from February 2 to May 11. (Sponsors are the Republic National Bank of New York, Safra Republic Holdings, S.A., and Banco Safra, S.A. Brazil.)

Freshly certified La Tours, sometimes even showing a signature under the surface grime of decades, continue to turn up every few years. The most recent, *Saint John the Baptist in the Wilderness*, was spotted at a Paris auction house in 1993 and eventually acquired by France. There are now a little more than 40 works unquestionably from his hand; another 40 or so are known from copies or archival mentions. The American exhibition has 27 authenticated La Tours along with 5 others that could be his or may be contemporary copies. The gallery also shows 3 engravings that appear to be versions of La Tour oils. In addition, there is useful context: 10 paintings by contemporaries or immediate predecessors who worked in styles and chose subjects resembling some of his.

Some four years ago, when Philip Conisbee, curator of French paintings at the National Gallery, began thinking about a La Tour exhibition, his aim was to bring together the dozen or so works now housed in American museums. But the tall, calm, British-born Conisbee has an abiding interest in "autograph versions," an artist's variations on a single subject.

So he set out to borrow from French museums. This was not easy. Having forgotten La Tour for 270 years, his countrymen now regard him with a possessive fervor. "In France," Conisbee says, "La Tour is a national icon. I have to say that French colleagues have been very generous, but it was very hard to get them to lend."

In *The Fortune-Teller* (detail), a young gypsy woman looks innocent as she snips the dupe's gold chain.

Nevertheless, the Louvre sent its version of what are familiarly known as "the cardsharp pictures" to provide the public with a fascinating look at two similar performances on canvas. It appears to have been a favorite moral subject of La Tour's: a handsome, richly dressed, smug-looking young innocent who has fallen into the power of some wily grifters. While the victim studiously concentrates on his hand, a pair of conniving beauties create a diversion and another player slips a winning ace out of the back of his sash.

The Louvre picture is *The Cheat with the Ace of Diamonds.* The Kimbell Museum version substitutes an ace of clubs but uses the same cast with some variations in colors and costumes (pp. 70-71). Both pictures are quintessentially early La Tour: there is no window to the outside world, no decorative foreground or background detail, no embellishment beyond expensive garments and jewelry and coins on the table. La Tour insists on focusing all the attention on the moral lesson of the hazard of trusting untrustworthy strangers.

The pictures have one other wholly conjectural interest. The young prey and the two women seem to be idealized images, imagined faces you do not expect to pass in the street. The "cheat," on the other hand, appears to be less an invention than a real person; a slender, good-looking man, he is clean-shaven in the *Ace of Diamonds*, and wears a mustache and wispy beard in the Kimbell version. In a 1976 study of La Tour, Benedict Nicolson, the British art historian, suggested that the figure could well be a self-portrait. Now, if La Tour did any portraits at all, none survive, but the conjecture is seductive, and Conisbee finds it hard to resist. "It has the kind of dashing, rascally look that I imagine La Tour had," he says.

"Rascally" is a fond contrast to the rather unpleasant

Musée des Beaux-Arts, Rennes

Although lacking conventional religious trappings, La Tour's austere *Newborn Child*, from the mid-1640s, is nonetheless deeply moving. Illuminated by a single candle, the figures take on a monumental quality.

person we encounter in the records of La Tour's late years, but then official archives are more likely to remember transgressions than exemplary behavior. The son of a prosperous baker, he was born in Vic-sur-Seille, a small market town in Lorraine close to the frontier between France and Germany. There is no record of him between his baptism on March 14, 1593, and his appearance as a godfather of a friend's daughter in 1616. That 23-year gap drives students of his work crazy.

No definitive clue exists to the vexing question of how or where, during that time, he was taught the fundamentals of art. In place of facts, we have a fretful industry of speculation. One view is held by the Caravaggists, who argue that, like many aspiring painters of that age, La Tour surely traveled to Italy to learn from that towering master of the baroque or from any of a large crowd of Italian followers. The National Gallery show includes a Caravaggio entitled *The Cardsharps*, which could well have inspired La Tour's cheats and which certainly set a fashion for genre pictures with a moralizing bent.

The art world celebrates Caravaggio for his dramatic contrasts of light and shade, elements that La Tour, in his middle years, explored with breathtaking virtuosity. But when Caravaggio died in 1610 after a short, careless, tumultuous life, he left a small army of followers across Western Europe. So we also have a school that argues that La Tour did not have to travel farther than Utrecht to take lessons from any of the Dutch painters—Dirck van Baburen, Hendrick Terbrugghen, Gerrit van Honthorst—who came back from Italy marked by encounters with Caravaggio's visions of the play of light. Yet another group, Philip Conisbee among them, argues that La Tour could have learned everything he needed to know without ever leaving Lorraine. His home province had its own school of successful Caravaggesque artists, a few of whom are shown in the Washington exhibition.

Musée des Beaux-Arts, Nantes

Details, such as paper stuffed under the strings, bring to life a blind hurdy-gurdy player from 1628.

At all events, by the time La Tour's marriage contract was recorded in 1617, he was entitled, according to the municipal entry, to call himself a painter. He married up, taking to wife Diane le Nerf of nearby Lunéville, two years his senior, daughter of the duke's superintendent of finances, whose family had risen into the new, minor nobility. In 35 years of marriage, the couple would produce ten children. Only three survived into adulthood, two daughters and a son, Etienne, who became a painter and worked with his father but inherited neither his genius nor his drive. The Washington exhibition has a late, rather damaged work, *The Education of the Virgin*, borrowed from the Frick Museum. A piece lit by the trademark candle, it hangs in the show as "attributed" to Georges. The Frick, on the other hand, labels it as possibly the work of Etienne.

Three years after their wedding, the young La Tours moved from Vic, settling permanently in nearby Lunéville, an important town where La Tour was, profitably, the only resident painter. Politically, Lorraine was a duchy; its ruling duke was Henry II, who became a collector of La Tour's art. After the French monarch swallowed part of Lorraine for his kingdom, the duke was replaced by a governor who also admired the artist. For six years, the town annually ordered a La Tour picture to be presented to him as a gift and paid sums large enough to keep the artist in comfort.

For his subjects, La Tour's earliest interests seem to have veered regularly between the spiritual and the temporal. The exhibition has three fine early images of saints, surviving pieces from a set of 13 half-length portrayals of Christ and the Apostles, which hung in the cathedral of Albi until the late 18th century.

But La Tour was also fascinated by life in the street, turning a remorseless eye on what Conisbee aptly calls the "existential isolation of poverty." The imagery can

Overleaf: In *The Cheat with the Ace of Clubs*, the fellow at the right is out of his league with this slick crowd.

J. Paul Getty Museum

Wielding a knife and a hurdy-gurdy handle, a street performer attacks a piper in *The Musicians' Brawl*, from 1625-27. Fascinated by life in the streets, La Tour often chose beggars and impoverished musicians as subjects.

be savage in its candor, yet it never effaces human dignity. The National Gallery show offers his crowded canvas of a mean beggar's "brawl" (above); a work-worn, hungry old couple scooping a meal of peas out of small bowls; and three portrayals of blind hurdy-gurdy players. The musicians are a much repeated subject; the Washington selection includes a monumental full-length singing figure with a dog crouched at his feet.

La Tour apparently became popular and successful almost as soon as he settled into Lunéville. The archives tell us he was godfather to the children of many friends and a witness at numerous weddings. He took on apprentices for good sums paid by their families, and bought property including a fine house.

The dusty old municipal records also reveal a difficult man who, particularly in his later years, was not exactly a model of civic virtue. There were complaints that he refused to contribute his quota to the poor while a famine raged, that he assaulted a sergeant at arms, and that he administered a savage beating to a peasant. One particularly detailed set of charges reported La Tour "making himself obnoxious to everyone by the great number of dogs . . . he keeps, acting as though he were the lord of the manor, sending his dogs after hare into the standing crops which they trample down and ruin."

This portrait of a rich, proud, bullying lord of the land sorts oddly with the work of the artist who, sometime in the 1630s, turned much of his attention to "nocturnes"—justly celebrated pictures of holy figures magically caught in the light and shadow of a flickering candle flame.

Given what we know of La Tour's asocial behavior, it might be tempting to think of his religious art as merely an act of commercialism, a shrewd effort to provide what monied society demanded. It was the time of the Counter-Reformation, with the Catholic Church striving to meet the challenge of Protestantism by stirring a new religious fervor. La Tour lived and matured in an age that produced new religious orders, new churches, new schools and, for those who could afford them, new styles of imagery of human holiness.

One of the striking aspects of his religious art was that, often, the men and women who peopled his canvases might have been encountered in the village square or the Friday fish market. They were neighbors transformed, indeed exalted, by belief and repentance. In the wake of the disasters regularly inflicted on Lorraine, the French scholar Jacques Thuillier tells us, the nocturnes became a "meditation on the fragility of man, the uncertainty of destiny, on suffering, death."

Helen Dudar, a frequent contributor to these pages, wrote on the 19th-century master Cézanne last April, and on Johannes Vermeer in November 1995.

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One of La Tour's most popular subjects appears to have been Mary Magdalene, captured and fixed at the moment when she has thrown away objects of earthly vanity, sometimes with her hand on a skull, often confronting her image in a mirror. There are five autograph versions of the subject—three in the show—and another three known from contemporary copies. The Magdalene story seemed to have had a solid hold on La Tour's imagination; each picture was somewhat different, each in its own way affecting.

The La Tour work most celebrated in the artist's time was perhaps *Saint Sebastian Tended by Irene.* Legend held that the Roman soldier, pierced by arrows and close to death, was miraculously nursed to health by the widowed Irene. Saint Sebastian was of signal importance in La Tour's day, the figure most often invoked against the never-absent threat of plague. One version of the painting was made for Louis XIII, possibly in a period when La Tour is thought by some scholars to have spent time working in Paris. The king was said to have been so smitten with the picture that he cleared every other painting out of his bedroom.

The original is lost, but the subject understandably became famous: at least ten copies from other hands exist. And it brought La Tour formal royal recognition adding to his luster and probably to his price. He was named *Peintre ordinaire du Roy,* an honor that gave him official standing as an artist of the royal court.

Almost certainly the keynote image, the best known piece in the National Gallery exhibition—surely the best known in Europe—is *The Newborn Child.* Postage stamps and Christmas cards have shown that young mother gazing raptly at her swaddled infant, the two radiant in the light of a candle shielded by the hand of an older woman, who may be the child's grandmother. The Rennes Musée des Beaux-Arts didn't want to let it go; it is the most important work in the institution. "It's their Mona Lisa," Conisbee explains. He finally negotiated the loan by offering in exchange a painting of Breton girls by Gauguin; the Brittany museum has no picture by that artist, so much of whose work was done there.

In scholarly circles, the subject of *The Newborn* has stirred thorny controversy. Given La Tour's tendency to place religious imagery in secular settings, some authorities consider it entirely plausible that the painting is meant to show us the Christ child with Mary and Saint Anne. Another school of experts insists it is not and can never be mistaken for a nativity scene. At least one admirer, Aldous Huxley, once argued that the question of intent did not matter. "Even if La Tour's art is totally lacking religiosity," he wrote, "it is nevertheless profoundly religious in the sense that it reveals with unequaled intensity the all present divinity."

Considering the disasters that periodically savaged Lorraine and its inhabitants, it is astonishing that La Tour was able to turn out paintings of such serene beauty and that at least some of them survived. Throughout the 1630s, the area was a magnet for devastation. Epidemics and famine filled the earth with victims. Soldiers fighting religious and political wars crisscrossed the countryside, pillaging as they went. One September day in 1638, as the residents fled, the entire city of Lunéville was burned.

Some experts are certain that the greater part of La Tour's work, possibly as many as 400 paintings, was lost to thievery or to flames. Here again, unanimity breaks down. Conisbee is persuaded that La Tour was too busy enjoying the privileged life of a country gentleman—he enjoyed his wine, he was a horseman, a keen huntsman—to be prolific, and the curator can imagine a life's work numbering little more than 150 pictures.

The life ended January 30, 1652, two weeks after Madame La Tour died. While public records reported the cause as pleurisy, it seems likelier to have been the plague. La Tour apparently left no will; his children, obeying his wishes, gave a plot of land he owned to the Order of the Capuchin Fathers.

Presumably, La Tour worked at his art sporadically until his fatal illness. At least one authority, Pierre Rosenberg, who is now director of the Louvre, saw a "slow deterioration" in the final years. In a 1973 study, he judged the painting in the late work poor, the invention exhausted. Perhaps, he suggested, La Tour's distance from the dominant art community in Paris was finally fatal to his art, and isolated as he was, he had no resources with which to renew himself. Perhaps. Yet, it is hard to feel more than a momentary twinge about this lapse in the presence of the enduring beauty he managed to leave behind.

In a detail of *The Magdalene at the Mirror,* c. 1635, La Tour captures an intimate moment of contemplation.

National Gallery of Art

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By Richard Wolkomir

The school where it's OK to major in fun and games

At Vancouver's DigiPen, kids who grew up playing Donkey Kong *and* Castlevania *train to create the video adventures of tomorrow*

If this were a video game, the screen might first show a stranger. He arrives in a rainy city.

Text unscrolls. Claude Comair, we learn, is the stranger's name. The rainy city is Vancouver. Here, Comair founds a school, DigiPen (short for Digital Pencil), where youths learn a kind of magic: teaching video-game machines to tell stories. But Comair's apprentices must overcome formidable obstacles, such as 65816 Assembly Language. Only then can they teach the Super Nintendo Entertainment System to spin a yarn of their devising. Will they reach their goal?

Now the gameplay begins . . . Emory Georges pitched his video-game idea as he rode the SkyTrain, high above Vancouver. "It's called *Vampyre Hunter*," he told David Yan. From the elevated commuter train, they could see across the city to the Coastal Range, plunging to Burrard Inlet, where cruise ships glided toward Alaska. But they ignored the scenery.

Dark and gothic, Emory said. That would be the game's setting. It would be like *Castlevania*, a classic from their childhoods, in which the hero fended off cartoon ghouls with a whip. His idea also had roots in another golden oldie, *Bionic Commando*, where the hero swung across the screen like Tarzan on a liana. But *Bionic Commando*'s hero moved at only two angles. Emory's *Vampyre Hunter* would swing all over the screen. The concept was definitely cool, David agreed, a good final class project. He promised his vote.

Build support. Emory (p. 97) had learned such strategies playing video games in Princeton, British Columbia, the copper-mining and lumbering hamlet where his father was the school district's secretary-treasurer. He and his friends had been aces at the consoles. Thumbing buttons and joysticks, they sent pixel heroes—simulacra of themselves—into onscreen struggles against trolls or space aliens. At stake might be the earth itself.

When it was time for college, Emory hoped to train for a career in the $15-billion-a-year video-game industry. The United States alone generated annual sales of $3.5 billion a year, approaching Hollywood's $5 billion or so box-office take. Across the country, kids (and adults, too) are entranced by these games in every format. Fans are still flocking to arcades and are glued to TV screens at home (where the little black console box and joystick offer access to everything from *Super Mario Brothers* to *Final Fantasy*). And they are sitting rapt before their PCs, another conduit to this compelling world. But, Emory found, North America had no video-game school. Stymied, he enrolled at Simon Fraser University in Vancouver, majoring in computer science and English, planning to teach.

At the end of his sophomore year, he read in *Nintendo Power Magazine* that a new game-programming school, DigiPen, with ties to Nintendo, would open in 1994 in Vancouver, the inaugural class set at 30 students. Emory was excelling at Simon Fraser. Even so, he rushed an application to DigiPen. So did 1,200 other eager students. But Emory was among the lucky. During his two-year course of study at DigiPen, he would see applications jump to 1,800 for the second class, then to a staggering 12,000 for the third class of 77 students. Applicants needed high grades. They also had to pass surprise telephone quizzes. "What," the voice from the school might ask, "is zero's cosine?"

DigiPen turned out to occupy two floors in a downtown office building. Students housed themselves, most sharing apartments. The class's sole girl stayed at a YWCA. Teachers were professional programmers and engineers from the industry. Courses proved intense. Emory was at school from 9 A.M. to 10 P.M., year-round, including Saturdays.

For a year and a half he studied Boolean algebra and logic circuits. He learned storyboarding and game concepts, transforming old myths into game plots. He wrestled with coordinate geometry and 3-D object representations. He mastered languages like C++ as well as programming techniques, from ray-tracing algorithms to sprite construction.

Just before his second Christmas at DigiPen, Emory

DigiPen classmates, flanking an emergent video-saga landscape—the realm of the evil Lord Vlad—refine their new game, *The Caves of Nevar: Vampyre Hunter.*

Photographs by Robert Holmgren

wearily put down his head on a classroom desk and napped. He awoke with the idea for *Vampyre Hunter.*

Riding the SkyTrain, he pondered the action, or "gameplay," particularly the hero's whip. It would be the Swiss Army Knife of whips, fitted with a toolbox of attachments. Certainly there would be a grappling hook, which the hero could use to clamber anywhere, snagging onto tree limbs or swinging from cornices. And maybe he could snap on a spiked mace, handy for fighting off monsters.

Meanwhile, Emory mustered votes. First he convinced Stephen Lee, originally from Hong Kong, who had a University of British Columbia computer-science degree but aspired to program games. Next, on the SkyTrain, it was David Yan's turn. Also a Hong Kong emigrant, David came to DigiPen because, as a child, he had perceived video games as magic, and he wanted to be the magician.

Eventually, Emory went after a key classmate, Patrick Meehan (below). If the class were a video game, Patrick might have played two roles, the Artist and the Wizard. He was 6 feet 3 inches tall, his brown hair closely cropped, and he liked wearing cutoff jeans with hiking boots and T-shirts picturing cartoon animals. He had a shy way of mumbling. He also had a quiet air of competence. Given a pad and a pen, he could sketch whatever you wanted. And, although only 19, he was already a video-games-industry veteran.

Patrick had grown up in Orlando, Florida, the youngest of three sons of a brokerage president. When Patrick was in the fourth grade, his school put him in a program for the gifted, which he despised. The classes bored him, and he lost his friends from the regular classes. He buried himself in art and in video games. His maternal grandmother, a schoolteacher with a 180 IQ, had once worked with him on art and on imaginative games, and he liked that do-it-yourself teaching. Now he persuaded his parents to let him try his own version of home schooling.

The making of a self-schooler

He spent the first six months at home mostly sleeping. "Detox," he called it. Then he launched into self-directed studies of music and drawing. He read stacks of science fiction, then literary novels. It was career preparation—he aimed to become a video-game designer.

He began, as he put it, "pestering" Sega and Nintendo, the two biggest companies, for a job, peppering them with his drawings. When he was 15, he received a message from Sega: "The next time you're in the Bay Area, talk with us." Patrick immediately boarded a plane to San Francisco. He arrived at Sega's offices thinking that he had come into his own at last. But Sega executives said he lacked math.

Back in Orlando, tutored by a high school teacher, Patrick roared through honors algebra, honors geometry and advanced algebra. Then, in 1994, at age 18, he read about DigiPen. He had already put in stints at Sega and Nickelodeon, working in video-game production. Patrick rushed off an application, and joined Emory Georges in DigiPen's inaugural class. One noon Emory and Patrick met over hummus sandwiches to consider Emory's *Vampyre Hunter* concept. Patrick could already imagine the artwork.

By the time the class met to choose its final project, Emory had the vote lined up. But one classmate, Mandi Paugh (p. 90), the class's only female, dissented. She wanted to do *Zana,* a game she had begun programming. It was an "overhead action adventure," in which the player looks down on the gameplay. But the real appeal to Mandi—petite as a gymnast, with blonde hair and bangs—was that the hero was a woman.

Mandi, a business executive's daughter, came from New York State. As a child she became a Nintendo Game Boy addict because she loved "the teeny weeny little game packs, and the way you could carry it around in your hand." She loved pushing buttons to get a response from Nintendo's Mario character, the mustachioed Ital-

Sketchbook at hand, artist and game designer Patrick Meehan shapes preliminary scenes for *Caves of Nevar.*

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Mandi Paugh, a member of DigiPen's inaugural class, takes a break with a Nintendo *Mario Brothers* game.

ian plumber from Brooklyn. By her senior year in high school, she was still unsure what to do. She enjoyed drawing, and an English teacher encouraged her to write. She was working on a novel for young adults. She also sent video-game ideas to several companies. But none responded. Then she read that DigiPen would be opening in Vancouver.

Mandi and a classmate, Brian Snapp, had developed the concept: Zana, from a magical world, is accidentally transported to a technological world. A villain steals her magic. To return home, she must get her magic back.

But Mandi knew *Zana* would not win the vote because it was a "story adventure," requiring "conversations" with characters in order to figure out clues. Such complicated games were less popular than action games, where players drive race cars or blast enemy spaceships or fight monsters. Besides, Emory had already worked out one feature for his game that makes a video game a hot seller: the novel way for the hero to move—his Tarzan-like swing. And programming the hero's swing was a challenge, making it a good class project. In the end, Mandi, too, voted for *Vampyre Hunter.*

A Nintendo of America senior engineer, Wayne Shirk, the liaison between the Redmond, Washington, company and DigiPen, dropped in sometimes to watch the students set up their *Vampyre Hunter* team. "Years ago one person could do it all in his garage," says Shirk. "Now it can take millions of dollars to produce a game, because you need several programmers, artists, musicians and designers, and it can take a year." DigiPen's class projects taught students teamwork, which Nintendo considered essential. Students are called on not to compete, but to engage in concentrated and cooperative creative ventures. The result, Nintendo hopes, will be a crop of ace programmers, trained to produce hot, new and eminently marketable games.

Nintendo supported DigiPen with equipment and advice because a handful of schools in Japan and one in England were the only others training game makers. As the industry switched to complex 3-D animation, and to television-linked consoles more potent than most desktop computers, video-game companies faced a talent shortage. Programmers would need to know everything from mathematics and physics to advanced animation, too much for self-teaching. And so Shirk closely followed the creation of *Vampyre Hunter.*

Step one was blueprinting the story and gameplay, such as how players would overcome adversaries and advance to more difficult levels. Emory began logging hours at the keyboard, drafting a plot.

Vampires, wrote Emory, had preyed on humans "since the distant ages of time." After an eon of war, humans believed vampires were extinct. But then wolves attack a village. The village Hunter tracks the wolves to a forest and kills six. But it was all a ploy: the seventh wolf turns into a bat and flies toward the village. When the Hunter returns, all is rubble, and his fiancée is gone. A stranger, old and wounded, one of the ancient vampire hunters, says a vampire destroyed the village and kidnapped the Hunter's girlfriend. Worse, the vampire bit her. Unless the Hunter slays the vampire before the next full moon, she, too, will become a vampire.

Following the game's clues, the Hunter tracks the vampire through the Cursed Glades to the Town of Nevar ("raven" backward), the trickster bird reappearing as an ominous symbol throughout the game. The vampire, the Hunter learns, is Lord Vlad, the realm's ruler. And Vlad has been showing off his bride-to-be. She is the Hunter's kidnapped fiancée.

Now the player is at the console—manipulating the onscreen Hunter's movements—and stalking the vampire, deploying his grapple-tipped whip to swing through the realm, fending off Lord Vlad's henchmonsters, unearthing clues, earning new powers. If he survives the successively more difficult levels of play, the

Frequent contributor Richard Wolkomir, who is based in Vermont, wrote recently on adult illiteracy and the renewed interest in the sport of fencing.

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hero finally confronts the vampire himself. Their battle decides the game.

In his apartment near the school, Patrick Meehan was sketching the game's characters. Sprawled in a low chair, his stereo blaring John Philip Sousa marches, Patrick drew the Hunter, giving him shoulder-length blond hair and the look of a health-club habitué attentive to his abs à la that hunkish heartthrob, Fabio. Primed for Vladicide, he wore sharpened oaken staves strapped to his forearms. But when Patrick sketched Lord Vlad (right), his pen strayed. Instead of Emory's ancient vampire, formidable with centuries of wisdom, he drew a young aristocrat, haughty, even somewhat effete, in a velvet suit. Patrick was adamant: "Mythology says vampires are eternally young." And so Lord Vlad became Patrick's arrogant youth.

After a video-game hero struggles through a battle, he typically must face an even tougher opponent, called a "boss." Now Emory found himself up against a real boss, Claude Comair (p. 96), DigiPen's founder. At the meetings, Comair played the role of a game company's powerful marketing chief.

"Yes, I am cool, and if you want to be cool like me, you have to know *more* than me," Comair sometimes told his students. By "cool" Comair did not mean looking like Brad Pitt—he was of medium height, with glasses. Not yet 40, he already had thinning hair, closely cropped. "Cool," as he used the term, meant smart about computers and business, and about the world.

Comair's father, a successful Beirut physician, expected his oldest son to carry on the family tradition. Dutifully, in 1974, young Claude crossed the Mediterranean to France to study medicine. But in 1977 he returned to Lebanon and, to his father's consternation, enrolled in a Beirut university to study engineering and architecture. After earning a graduate degree, Comair worked as a researcher at a Japanese university, applying computer animation to scientific and engineering problems. In 1988, with his Canadian wife, he migrated to Vancouver and became a Canadian citizen. Comair founded a company that provided computer animation to scientists and engineers for such projects as analyzing why an engine failed.

His company could serve the entertainment industry, too, he decided. To recruit artistic talent, he offered training in computer graphics to students at Vancouver art and film schools. He was astonished when a hundred students signed up. To handle the influx, Comair started an in-house school—its faculty drawn from industry—training students for any field using computer graphics. One day he realized no North American school taught video-game programming. Comair decided to create a second school for video games.

Nintendo of America proved an enthusiastic backer, supplying up-to-date Nintendo workstations on which

The villain central to the action of the *Caves* game is an effete and ruthless vampire, the dreaded Lord Vlad.

One of many fearsome foes the hero will encounter, the Mudman is a muscle-bound purveyor of mayhem.

Caves' hero, the Hunter (foreground), must traverse daunting territory, such as the shadowy Tombs terrain.

A study for a benevolent character introduces the generous Dragon, who offers his powers to aid the hero.

the students could learn programming. Nintendo experts also helped Comair develop the curriculum. But graduates could seek work anywhere.

Nintendo's backing was an attraction. For game enthusiasts the company's rise from obscurity to international corporate Godzilla had all the glamour of Rome's imperial ascension. Patrick Meehan, for one, had stayed up all night ingesting journalist David Sheff's 1993 book about the company, ironically titled *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children.*

As Sheff told the story, it had several beginnings. One was in Cambridge, Massachusetts, in 1962, when an MIT graduate student created what was probably the first onscreen game, *Spacewar,* played on the era's brontosaurus computers. By the early 1970s, computer whiz kid Nolan Bushnell was marketing a similar game, sans computer. His game emanated from a cheap console and played on an ordinary black-and-white TV. Working knobs, players raised or lowered onscreen "tennis rackets"—inch-long bars—to bat a "tennis ball," actually a glowing blob. Each hit made a sound that gave the new game its name: *Pong.* Bushnell's company, Atari, became a phenomenon. Its early employees would go on to help create Silicon Valley, with such wunderkinds-to-be as Steve Jobs and Steve Wozniak, who later would team up to found Apple Computer.

Meanwhile, in Kyoto, Japan, the Yamauchi family had been manufacturing playing cards since 1889. After 1959, when they added Disney-theme cards, the Yamauchis shifted to children's games and toys, renaming their company Nintendo. In 1975, the reigning Yamauchi, Hiroshi, eyed the newborn U.S. video-game industry—companies like Atari and Magnavox, which sold consoles that hooked to your TV to play onscreen games. First Yamauchi licensed Japanese rights to Magnavox's system, improved it, and got Nintendo's toe in the new business. Then he directed his researchers to create new hardware that would vault Nintendo ahead.

In 1983 Nintendo introduced a souped-up console, in effect a stripped-down computer, that generated more vivid games. And with its new consoles selling for $100, about half the going price, Nintendo blew away the competition. But the company needed super new games. Hiroshi Yamauchi, the business genius, now sought a creative genius.

Sigeru Miyamoto, every DigiPen student's hero, grew up near Kyoto, dreaming of becoming a puppeteer or a painter. In college he skipped half his classes, wandering off with his sketchpads. And by graduation he knew he was unfit for any regular corporate job requiring a tie. When he was 24, he impressed Hiroshi Yamauchi with his ideas for toys, becoming Nintendo's first staff artist. And then Yamauchi assigned him to fix a Nintendo game that had bombed.

Tools of the trade: video-game programmer's essentials include plastic animation figures and the trusty mouse.

Miyamoto hated the game because it was simply about blasting enemy planes. Instead of fixing it, he threw it out and started fresh. He thought of a gorilla, the pet of a goofy carpenter with a big nose and a bushy mustache. Feeling ill-treated, the grumpy gorilla carries the carpenter's girlfriend to the top of a skyscraper. To rescue her, the carpenter must reach the top himself, climbing ladders, riding conveyor belts, while dodging barrels and beams that the gorilla throws at him. Miyamoto composed a happy background tune. And for a name he hit upon *Kong*, evoking a gorilla, and finally *Donkey Kong*, suggesting a primate character who was both wily and stubborn as a mule.

Donkey Kong became a sensation. Miyamoto then turned the mustachioed carpenter, Mario, into a plumber. He created a brother for him, Luigi, a tall string bean to Mario's plump little radish. He had the plumbers make their way through a world of neon-green pipes. And he called the new game *Super Mario Brothers*. Kids worldwide, polls showed, knew Mario better than Mickey Mouse.

DigiPen's students knew all that. They realized other companies, particularly Sega, had risen to challenge Nintendo's dominance. And they knew a corporate world war was under way with billions at stake. The weapons would be powerful new game consoles presenting action in vivid 3-D. But for the moment, debating the fine points of *Vampyre Hunter*, the team had its own war, Emory versus the "boss."

"*Vampyre Hunter*—with a *y*"—Claude Comair considered the title with the class, in his Lebanese-French-inflected English. "This tells you nothing, gives you no sense of where it is going, this name, and it is lacking in depth—it has no mystery, no suspense."

The debate about the game's title quickly became an argument over the inner mechanics of the narrative itself. As Emory had structured the game so far, it began with an aerial view of Vlad's realm, showing the sites of play: the Town of Nevar, the Cursed Glades, the Castle, the Tomb, the Bridge. Swinging his way through these sites, the hero would unearth clues or artifacts giving him new powers, or he would fight Vlad's henchmen, leading to the final battle with Vlad himself.

One secondary battle would take place in the Caves of Nevar. Claude Comair hit upon these mysterious caverns. "In these caves is where the showdown should happen," Comair said. Here the hero and Vlad would fight their final battle, the most difficult level of play. And the game's new name, Comair suggested, should instead be *The Caves of Nevar.*

"But," Emory was quick to protest, "the story would have to change."

Teams run on compromise. In the end, the class opted for a new title, *The Caves of Nevar: Vampyre Hunter.*

And at another meeting, Emory once again found himself facing Comair. "This fiancée, the Hunter's abducted girlfriend—why is she a victim?" Comair demanded. "This does not relate to me as a man of the Nineties! This woman is weak, and she is not determining her own fate." He had another compelling argument: "This is not good marketing!"

"But it's just background," Emory sighed.

Comair wanted to make the *woman* the hero. Sixty percent of game buyers are boys, mostly 6 to 14 years old. But Nintendo's Wayne Shirk sees a growing female market. A woman hero, Comair argued forcibly, would be a novelty. And a game featuring a female hero would appeal to girls.

The heroine: devising her own rescue

This time the class sided with Emory. As Brian Snapp put it, "This story is set in the Middle Ages!" But bosses must be appeased. And so the team toughened the girlfriend. Emory gave her a "fiery spirit," the very reason she appealed to both the Hunter and Lord Vlad. At one point, she would engineer her own escape. She would also send the hero messages, relaying instructions to him. And driving the drama was Vlad's bite: if the Hunter failed to decipher all the clues and fight off the vampire's assorted henchmen and finally best Vlad himself in the Caves of Nevar, his girlfriend would become a vampire. She would be even more powerful than Vlad, so formidable that the Hunter—and the player—would then inevitably lose.

But the plot was just a starter. As one student sniffed, "Anyone can think up concepts—we can *code them in!*"

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DigiPen's founder, Claude Comair, opened North America's first video-game-making school in 1994.

Over lunch in a Vancouver restaurant, Claude Comair explained the fine points of game programming. "First, a programmer has to know physics," he said. "Consider making the hero of *Caves of Nevar* swing with his whip," he continued. "Well, you must know the physics involved in a rope swinging—tension, flexibility—and the more I understand physics, the more it will look right."

Having mastered physics, the programmer becomes a pointillist painter. That is because a video screen is really row upon row of dots, called pixels, each dot identified in the computer's memory by a number. To create an image, the programmer assigns each pixel a color. Depending on the system's power, the choice of hues runs into the millions. Finally, the programmer codes into the computer the instructions for turning individual pixels on or off, creating the chosen image. By further instructing the computer how long various groups of pixels are to be illuminated, the programmer can create the illusion of animation.

So complex is that task, teaching a computer to turn light dots on and off in specified sequences, that DigiPen students become initiates in a digital priesthood, speaking in arcane tongues, such as 65816 Assembly Language. As Patrick Meehan said of programming one day, "How can you turn a few numbers into a world?"

One afternoon, a group of DigiPen students trekked through rainy streets to Lion's Lair, an amusement arcade. They wanted to show some visitors one facet of the games world. Some games are designed for desktop computers. Others are played on the Internet. The majority are played on at-home consoles. But arcade games, with their huge screens and high-realism images, showed game design's near future.

One visitor was Scott Jacobi, a prospective student. Scott was studying cognitive science at the University of Pennsylvania, but he hoped to attend DigiPen after graduation. "After DigiPen," he says, "I'll go on to Carnegie-Mellon University for a PhD: my thesis will focus on video games. We're the first video-game generation; not many studies have been done on the effects."

At the Lion's Lair arcade, Scott ignored the murky pool-hall atmosphere and popped a coin into *Street Fighter Alpha 2*. Onscreen, with movielike realism, a fit-looking woman battled a male thug, while Scott furiously manipulated a joystick and buttons to direct the woman's punches and kicks.

Not all the games were about busting chops. There was *Daytona USA*, a chance to drive a race car, wrestling a steering wheel while stomping the accelerator or brake. There were puzzle games, like *Tetris*, in which geometric shapes rain down, the player struggling to steer them into position. And there were sports games like *Virtua Striker*, ersatz soccer requiring only finger muscles. But many of the arcade games offered situations like *Virtua Cop 2*: mean streets where you must blow away bad guys before they get you.

Back in DigiPen's clean classrooms, one of the day's visitors questioned the violence in many of the arcade games. Emory looked faintly stricken. "There *is* gore and all that in some games, but it's not real, and it does not make you want to go out and kill real people," he said.

Claude Comair, listening in, pointed out that the games are a medium, like movies. Many video games, he observed, are not notably more violent than chess. "I condemn violence in a game, where you maybe take off a head and see blood flowing, but I do enjoy strategy—you should not condemn the machine for what is created for it," Comair asserted.

What about neuron decay from excess video gaming? Patrick Meehan shrugged. He played games, he said, but he was also reading novels by Martin Amis and Umberto Eco. And games, Comair noted, do not automatically make you stop studying. "Besides, evolution is inevitable in a society," Comair mused quietly. "If these kids are indeed more graphic-minded today, and less print oriented, it's up to them to make something of that."

Video games can be social, Emory said. He and his friends had worked together to win. "And I liked actually interacting with an adventure," Emory added. "The game wasn't real, but the *effort* was real!"

It is now the last few weeks before graduation. A delegation of DigiPen seniors is back from Chicago, flown there for interviews by a game company, picked up by a

limousine. Most of them are mulling over several job offers. But Patrick Meehan has already decided. He will work for Nintendo.

DigiPen, too, has just made an announcement. The corporation will remain in Vancouver, but the school will expand to become a nonprofit four-year degree-granting college, opening this fall in Seattle. Claude Comair and Nintendo have decided that, with the field evolving rapidly, two years of training are not enough.

Now the students are putting finishing touches on *The Caves of Nevar.* At one computer, Mandi Paugh has the game's opening "Overworld Map" onscreen, showing the sites of play in magenta, green and brown. Moving a joystick, she marches a tiny figure across the map. It is the game's blond hero in a blue jumpsuit, but viewed from above, foreshortened, looking elfin. Actually, the image is a free-floating pixel assemblage called a "sprite," an apt name for this pixielike figure. Mandi enlarges the sprite into a screen-filling grid of colored boxes. "See, I can add some blue here and fix the hair a little over there," she says, fingering keys. "Then I save it out as numbers—it took a year to write this program."

To check her work, she shrinks the boxes back into the hero. For fun, she arms him with a Magic Scythe. "You use that to slice and dice your enemies into monster kibble!" Mandi says. "Oh, I've got an idea," she suddenly says. Not long afterward, she rushes into a workroom where Emory and Patrick and others are conferring at a workstation. She brandishes a computer disk. "Look at this," she says. They feed the new data from Mandi's disk into the program. Again the sprite stands on the Overview Map, ready for the game to begin. "See what he does when you aren't working the controls and he's just up on the screen, waiting for you to tell him what to do," Mandi says.

For a few moments the sprite looks expectantly out at the player. He begins blinking his eyes. Then he crosses his arms, bored. He taps an impatient foot. Abruptly he keels over, snoozing. *The Caves of Nevar* is done. Now, for DigiPen's first graduates, the real game begins.

Still playing video games in their spare time, DigiPen graduates David Yan and Emory Georges check out the offerings at a Chicago arcade. Arcade games, with huge screens, high-resolution images, prefigure the future.

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ELDORADO

LIVE WITHOUT LIMITS

By Bruce Watson

Three's a crowd, they say, but not at Coney Island!

The old place has had its downs and ups, from a wild man from Borneo to glittering Luna Park, but it's still happily roller-coasting along

Opposite: Part of a crowd trying to cool off in 1940 was surprised by the famous photographer Weegee.

Above: Luna Park, with arches and turrets rimmed by 250,000 lights, glows brightly for the multitude.

As the sun warmed the Boardwalk, crowds began streaming off the D train at the end of the line in Brooklyn. Before they reached Surf Avenue, they smelled the aromas—sizzling hot dogs, steamed clams and cotton candy. Before they heard the ocean, they heard the fun—roaring roller coasters, the toot of a calliope and the cry of "Step right up, folks!"

There were other things to do in New York on this Fourth of July. Baseball fans could watch the Dodgers battle the Giants at Ebbets Field. Broadway matinees included *Oklahoma!* and *Born Yesterday*. Movie houses were showing *The Best Years of Our Lives*, with Fredric March, and *Stallion Road*, starring Ronald Reagan. But for patriotic New Yorkers in 1947, there was only one place to spend the Fourth. On that Independence Day everybody and his brother, along with sisters, aunts, uncles and cousins, went to Coney Island.

All morning, thousands each minute poured out of the subway. By noon, the beach was a quilt of towels hiding the sand. The shoreline was elbow-to-elbow. A surge of bodies and bellies moved through the Midway. Under the Boardwalk, blanketed couples courted privacy while

high above, would-be daredevils dangled like dolls from a steel parachute tower. Screaming, squealing, they fell to earth, drifting down beneath silk canopies to land, ready for more fun. Fun swirled in the madness of carousels and bumper cars. Fun gulped down like hot dogs and lukewarm beer. Fun just knowing that this sea of strangers had come just for fun.

A generation later, a crowd of 400,000 at Woodstock would be touted as an epochal event. But over this four-day weekend almost a half-century ago, some six million people came to Coney Island. These days, it's hard to imagine such crowds, but when Coney Island was "America's Playground," multitudes were its stock in trade. From the turn of the century, when it was a dreamland of lights, up to today, when a Yale graduate runs his own freak show there, Coney has defied natural laws. Its rides defy gravity, its prices defy inflation, and its spirit, despite hard times, defies gloom. Call it the "Nickel Empire," "City of Fire" or "Poor Man's Paradise." By any name, Coney Island is the show that never ends.

So, step right up, folks! See an empty strip of sand in Brooklyn become the most famous amusement spot in the world! Gawk at the dazzling lights, visible from 30 miles at sea! Learn about the famous stars who got their start right here on Surf Avenue! See the Creation of the Universe, Heaven and Hell, all on Coney's stages! Watch flames burn entire amusement parks to the ground! Meet the Mule-faced Boy, the Blue Man and the Human Blockhead! It's all right here at Coney! Have your nickel ready! You're just in time!

Before the Civil War, the beach at the west end of Long Island was a lonely place. Gone were the rabbits Dutch settlers called *konijn*, giving Coney its name. Though the place was no longer an island, thanks to some landfill in a creek dividing it from Brooklyn, getting to it was still a chore. Those who came, mostly by steamer, did so for the quiet. In the 1840s, Walt Whitman strode the empty beach declaiming "Homer and Shakespeare to the surf and seagulls." Wealthy patrons, from Daniel Webster to John C. Calhoun, stayed at a few resort hotels. But Coney Island wasn't having fun yet. Then after the agony of the Civil War, as American industry expanded, huge pavilions went up and began catering to crowds who came by rail. By the 1870s, the boy who would change the way America played had moved into the Surf House hotel, owned by his father.

George C. Tilyou is not a household name like P. T. Barnum or Walt Disney, but Tilyou was their equal as a showman. As a teenager, he hawked bottles of "authentic" Coney Island sand for a quarter each. By the time he was 20, Tilyou was running his father's hotel, and thinking big. "If Paris is France," Tilyou wrote, "then Coney Island, between June and September, is the world." When America's first roller coaster opened at Coney in 1884, Tilyou learned the value of cheap thrills. The coaster's top speed was six miles per hour, yet riders lined up for hours for the thrill.

Coney Island was already crazy and crowded. Splashing together in its waves, women in full-length bathing dresses and men in tank tops flouted Victorian morals. Hotels, including one shaped like an elephant, served oysters to the elite. More plebeian visitors, up to 80,000 people on a warm day, dined on "Coney Island hots," America's first hot dogs. If tens of thousands wanted vice—saloons, gambling and prostitution, which briefly earned Coney the nickname "Sodom by the Sea"—millions just wanted to have fun. Coming from cramped tenements, they wanted wind in their faces and a place where they could blow off steam. Coney's seamy side scared away many, but Tilyou saw that if the place could

be cleaned up, untold numbers would come. So he testified against John Y. McKane, a local political boss who controlled Coney's seamy side. Tilyou had to leave town temporarily, but when McKane was sent to Sing Sing, the showman came home with plans for a playground.

First, a Ferris wheel like the one Tilyou had seen on his honeymoon at the 1893 Chicago world's fair (SMITHSONIAN, June 1993). Next, an aerial slide and a bicycle railway. Finally, modeling his main attraction after a British ride, Tilyou built a mechanical horse race on metal tracks. In 1897, the fun began in what he called Steeplechase Park, a place of many-splendored rides. "Step right up, folks!" the barkers yelled. "Come see Steeplechase, The Funny Place! Ride the Double Dip Chutes! Whirl your honey in the Whichaway! Roll her in the Barrel of Love! Swing her on the Wedding Ring! Talk about love in a cottage! This has it beat by a mile. Don't be a Gloomster! Be a Steeplechaser!"

The park was an instant hit. Its rough-and-tumble rides provided couples with an excuse to grope each other and gave everyone a chance to laugh at everyone else. The Wedding Ring perched 70 riders on a great swinging wheel. The Barrel of Love rolled couples around in a big revolving drum. The Whichaway whirled passengers into one another's laps. The world had never seen anything like it. Then, in 1903, two of Tilyou's former employees built Luna Park. On opening night, as thousands mingled around its entrance, 250,000 lights went on at once. Crowds of people, still living in the age of gas lamps, gaped and rubbed their

Daylight view of Luna Park (left) shows why, at 22 acres, it was not only the biggest but most imaginative amusement center at Coney. On Comedy Lane (above), air jet puts a visitor's costume in considerable disarray.

Clara Bow, here braving a whimsical Coney ride for the 1927 film *It*, was known for years as the "It" girl.

eyes. Luna Park was a fairyland of moons, lagoons and towers. By day it looked like a wedding cake, and by night it looked like a dream. When it opened, its designers had just $11 left. They had to scrounge for ticket booth change. Six weeks later, they had recovered their $700,000 investment.

Soon young men and women weary from a week's work rode the nickel trolley to the end of the line in Brooklyn. There they acted as they simply couldn't at home. One of Coney's regulars, a young seamstress named Agnes, described an outing with a friend from her native Germany. "When we had been on the razzle-dazzle, the chute and the loop-the-loop . . . I asked her how she liked it," Agnes remembered. "She said: 'Ach, it is just like what I see when I dream of heaven.'"

Years before movies became commonplace, Coney Island pioneered the art of simulation. Using smoke, a swaying ship and starry panoramas, Steeplechase's "Trip to the Moon" blasted passengers into space. Once on the moon, passengers traipsed through lunar caverns and met moon maidens who dispensed bits of green cheese. Go ahead and laugh, but the state-of-the-art simulation made some impressionable passengers faint. Luna Park simulated trips to the North Pole, to 20,000 leagues under the sea, and to the mysterious East. Luna's "Streets of Delhi" featured royal palaces, dancing girls and "an astonishing number of real Eastern people" actually brought from India "for your amusement."

By 1907, visitors were mailing 250,000 postcards a day, making Coney Island world famous. Soon Coney was graced by illustrious foreign guests. "Fabulous and beyond conceiving," wrote Russian writer Maxim Gorky of his first glimpse of the City of Fire in 1906, though he went on to describe it as a "marsh of glittering boredom." Three years later, on his only trip to America, Sigmund Freud went to Coney Island. There is little record of what Freud did at Coney, but one is tempted to guess about his favorite park. Dreamland, of course.

Dreamland was perhaps the most fabulous amusement park ever built, the last word in Coney Island glitz. Opened in 1904, the park was lit by a million lights, far more than most cities at the time. It was painted white, adorned with arches and statues, and dominated by a 375-foot central tower. It surpassed the simulations of Luna Park by adding a heaven and a hell. "Heaven" was part of "The Creation." "Hell" was nearby, with a huge devil leering over its entrance. Gorky dismissed Coney's hell as "very badly done," but when live devils tormented sinners who had drunk whisky by casting them into a smoky pit, more than one in the audience must have repented. If they survived "Hell," the visitors could watch the eruption of Mount Vesuvius. An African village with live costumed Somali warriors, and a tiny town featuring 300 midgets, were also daily attractions.

By then you could find practically anything at Coney Island. At Perry's, you could be served by a youthful singing waiter who would become famous as Irving Berlin. At Carey Walsh's place, a piano player named "Ragtime Jimmy" Durante performed with waiter Izzy Iskowitz, later known as Eddie Cantor. If you knew where to look, you could even find life and death. Life came in small packages—premature babies kept alive in incubators run by a doctor promoting his research. And death came to Topsy. At Luna Park, Topsy the elephant had killed three visitors—including one who fed her a lighted cigarette—and had to be disposed of. She survived carrots laced with poison. A hanging was ruled out by public protest. So Thomas Edison, whose lights lit Coney, offered to prove the power of his alternating current. Charging admission to the execution, Edison attached electrodes to Topsy and threw the switch. Smoke billowed from the elephant's body. In a few seconds the poor animal toppled and fell dead.

"Admission to the Burning Ruins—10 cents"

At Coney, nightmares usually came first as drama. Dreamland's daily show "Fighting the Flames," for instance, featured a burning six-story building, people leaping into nets, smoke, panic and real fire. But the huge parks, built of sticks, lath and plaster, cheaply wired and rigged, were infernos waiting to happen. In 1907, Steeplechase nearly burned to the ground. The next day, Tilyou posted a sign announcing "Admission to the Burning Ruins—10 cents." A year later, Steeplechase was back in business. Dreamland was not so lucky. On the first night of the 1911 season, a worker knocked over a bucket of hot tar. In three hours, fire turned its towers into torches. Lions and tigers perished. The wild man from Borneo fled in his pajamas. The premature babies were rescued from their incubators, but Dreamland, insured for a fraction of its value, never reopened.

Fire only brought Coney Island's first act to a close.

Sampling the pleasures of Coney, clockwise from the famed 260-foot parachute drop: kids saddle up for the "Steeplechase" ride; a somewhat more sedate crew (circa 1904) shoots a waterfall in a boat that actually ran on metal rails; a guy and some dolls get spun off their feet in the "Human Whirlpool"; trying to beat the system and stay dry, a nattily clad chap negotiates a water hazard on three lank ropes.

Coney Island's beaches were not always crammed; here, three children quietly ponder the immense Atlantic.

A couple kisses by the Boardwalk; once goings-on beneath it won it the name "Hotel Underwood."

Luna Park and Steeplechase kept the fun going, and in 1920, when a new spur of the BMT subway reached Coney, crowds swelled to biblical size. The Roaring Twenties also brought the fabled Boardwalk, almost two miles long and 80 feet wide. The Boardwalk gave Coney Island a new promenade. "Under the Boardwalk" wasn't yet a popular song, but it was such a popular courting place that people began calling it the "Hotel Underwood." And you never knew who you'd see on the planks above. Striding down the Boardwalk one summer in the early 1920s was a handsome man on stilts wearing a sandwich board advertising "Steeplechase—The Funny Place." You had to look quickly. He left after one summer and went on to become Cary Grant.

By the mid-1920s, the place had achieved mythic status in American culture. Though more than 1,500 amusement parks dotted the country, each did its best to be Coney. Some even called themselves Coney Island. Parks named Luna can be found from Seattle to Sydney, Australia, where hot dogs are still called "Coneys."

Between World War I and World War II, where a City of Fire had risen and burned, a new Coney—the "Nickel Empire"—flourished. A nickel subway ride got you there. A nickel bought a hot dog at Nathan's Famous Frankfurters, which set up shop in 1916. A nickel for a milk shake, a nickel for most rides. But not everything cost an entire nickel. An orange soda cost 3 cents. For two decades, Coney's nickel thumbed its nose at inflation. In 1939, a city editor sent a cub reporter to Coney. "Take your wife, go on every ride in the place," the editor said. "Eat your heads off and write a piece about what happened. And be sure to keep track of your expenses." The reporter took his wife, went on every ride, ate his head off and sent in an expense account for $5.50.

The Nickel Empire soon became the site of a weekend ritual. Early mornings, Mom, Dad and the kids gathered their beach goods and headed for the subway. Clacking along under Flatbush Avenue, they joked with others riding the D train with the look of ocean in their eyes. Exiting at Stillwell Avenue, they tumbled into the crowds. The rush was on to get to the bathhouses, which rented suits, towels, beach chairs and umbrellas. Dressed for fun, the family followed the scent of salt air to stake their claim on the sand. On the beach, impromptu neighborhoods overflowed with energy and pranks. Though they spoke many languages, people were united by the common desire for fun. After a quick dip, the family might visit the Boardwalk for hot dogs or a ride in a "rolling chair," a wicker contraption wheeled over the planks. By late afternoon, the family traded wet suits for dry clothes and returned to Surf Avenue to sample its rides and refreshments. Then it was back to the subway and home again—Coney Island having revitalized them for another week's work.

In the Nickel Empire, attractions grew bigger, faster, weirder: horses diving from platforms; "guess men" who guessed your weight, age, occupation; clowns with cattle prods who mildly shocked innocent bystanders. Every

Bruce Watson has written 22 pieces for SMITHSONIAN *since 1989, on subjects ranging from the Luddites to Gibson guitars to the Peace Corps in Kazakhstan.*

amusement park had its Ferris wheel, but only Coney Island had the Wonder Wheel, with cages that rocked and slid along tracks inside the 135-foot disk. In 1920 the Wonder Wheel replaced the Statue of Liberty as the first sight immigrants saw as they sailed into New York Harbor. Pumping up the adrenaline, Coney's showmen built roller coasters with hair-raising names like the Tornado, the Thunderbolt, and in 1927, the Cyclone. With its 60-mile-per-hour plunge, the Cyclone soon drew lines five hours long. Charles Lindbergh has been quoted as calling the coaster "a greater thrill than flying an airplane at top speed."

The "Siamese twins" went their separate ways

Weirdness, too, had its heyday in the Nickel Empire. Since Coney's early days, sideshows had displayed bearded ladies, midgets and other attractions. So long as dreams were Coney's most important product, the freaks stayed on the side. But after Dreamland burned, its "Congress of the World's Greatest Living Curiosities" came out in force, led by Samuel Gumpertz, a celebrated freak collector. Gumpertz made dozens of trips around the world, shamelessly bringing back human oddities for the titillation of Coney's crowds. His collection included Jolly Irene, weighing in at 689 pounds, microcephalic "pinheads," Ubangi women with stretched lips, and Sober Sir Edward, offering $100 to anyone who could make him laugh. Some sideshows were outright frauds. Once a pair of Siamese twins argued onstage, split apart and walked off on their own. The show's owner joked, "I guess I wasn't the first man to be fooled by a corset." But other freaks, sad to say, were real. The Blue Man, who drank silver nitrate to dye his skin, and freaks like those in today's supermarket tabloids were on display for a nickel. Step right up!

Even though the Depression laid many amusement parks low, Coney Island managed to mock hard times. By the late 1930s, Coney's five-month season was drawing 25 million people, more than all the major league baseball games around the country. By then, this small strip of sand held the world's two largest fun parks, 60 bathhouses, 13 carousels, 11 roller coasters, 2 waxworks, 6 penny arcades, 5 tunnel rides, 20 shooting galleries, 3 freak shows, and 200 snack bars and restaurants. During the war, blackouts dimmed Coney's lights each night, but still the crowds grew. Servicemen hurled baseballs at cartoons of Hitler and Mussolini, and played at parachuting from the huge tower moved to Steeplechase from the 1939 New York World's Fair. Hot dog prices had finally risen, but only to 15 cents. War heightened the country's need for fun, and at Coney Island, it seemed the fun would last forever.

Then on a hot August day in 1944, "Fighting the Flames" did an encore. A short circuit ignited a restroom ceiling at Luna Park. As a half-million bathers watched from the beach, fire gutted the Shoot-the-Chutes and the Boomerang, melting minarets and moons. Owners rebuilt portions of the park, but Luna closed for good in 1949. On the strength of its reputation, Coney continued to draw record crowds. But America's play habits were changing, and Coney's reputation was fading like an old roller coaster ticket.

A Coney Island of the Mind, the title of Lawrence Ferlinghetti's 1958 book of poems, spoke volumes about the vulgarity of pop culture. Compared with high-tech parks like Disneyland, Coney Island was suddenly passé. Families who flocked there by subway began playing in backyards or driving to less crowded beaches. Home air-conditioning offered the breezes once found only at the beach. TV brought sideshows into living rooms.

Yet another Coney Island was already taking shape, planned not by showmen but by bureaucrats. New York's powerful parks commissioner Robert Moses had long hated Coney Island, that "mechanical gadget resort." Throughout the 1940s, Moses tried to spoil the fun, banning everything from bicycling to digging holes on Coney's beach. After Luna burned, city planners followed Moses' lead, tearing down rides and building high-rise housing. As more people began to live at Coney, fewer came to play. Of the three great parks, Steeplechase alone continued, but finally it, too, surrendered. On September 20, 1964, a band played "Auld Lang Syne" and a bell tolled once for each year the park had been open. Then the lights went off at George Tilyou's Funny Place. The party was over.

Last July 4, I rode the D train to the end of the line in Brooklyn. Though I grew up in California near Disney-

"Nathan's Famous" began dispensing hot dogs in 1916 and still does; a nickel then, they now cost $2.

Helping keep carny alive these days, showman Bobby Reynolds hawks tickets with a python around his neck.

land, I'd heard about Coney Island all my life. But I hadn't heard much lately. Expecting a ghost town, I found a few ghosts. On a weed-choked vacant lot stood the Thunderbolt, charred by fire. Above the Boardwalk, the parachute ride loomed like an exploded Eiffel Tower, but no one dropped from its heights.

Yet even though it is part ghost town, Coney Island is also part phoenix. The Cyclone, condemned in 1969, was saved when fans around the world signed petitions. Seventy years old, and rebuilt bolt by bolt, the Cyclone thrills a new generation of white-knuckled riders. Across the street, I rode the Wonder Wheel. I roamed through Astroland Park, sampling its Midway attractions. I ate a hot dog at Nathan's Famous (cost $2) and joined a crowd at its annual eating contest. While we chanted "Eat, eat, eat!" 290-pound Edward Krachie wolfed down 22 hot dogs in 12 minutes, a new world's record. I strolled the Boardwalk, eavesdropping on conversations in Russian, Vietnamese, Spanish, Arabic and English. And a dozen yards off Surf Avenue, I heard a barker's cry, and so met Dick Zigun.

When he graduated from the Yale School of Drama, Zigun didn't follow his classmates to Broadway. Raised in P. T. Barnum's Connecticut hometown, Zigun regards sideshows as an American art form. In 1980, he formed Coney Island USA and began producing special events like the annual Mermaid Parade. Then, recruiting sword swallowers, contortionists and fire-eaters, he opened Sideshows by the Seashore, a "National Center of Americana Bizarro," just off Surf Avenue. "The sideshow is the granddaddy of all American entertainment, older than vaudeville," Zigun told me. "Its appeal has always been vitality and visceral thrills."

Sideshows by the Seashore, open weekends all summer, begins outside. On a "bally" platform in front of Zigun's establishment stand Zinobia the Bearded Lady, Kiva the Whip Lady, a strongman and a midget. Drawing a crowd, they lead visitors into a small theater. There the Human Blockhead hammers a nail into his head. The Bearded Lady juggles machetes. A snake lady dances with a live Burmese python. Yes, it's sick. Of course, it's bizarre. In the case of Madame Twisto, the contortionist, it's totally twisted. But somebody's got to do it. This is Coney Island. "Coney Island is much smaller than it used to be," said Zigun. "But it's doing a good job of hanging in there."

Across the street stood another sign of resurrection. Bobby Reynolds had come back to his "personal playground." Reynolds was just 9 when he began gathering penny soda bottles, shining shoes and imitating the local pitchmen. He soon became the Nickel Empire's youngest magician. After 30 years away from Coney, working for Ringling Brothers and performing in nightclubs, he returned in 1990 to convert an abandoned bank into a sideshow museum, complete with wax figures, photographs, live acts and a magic show.

So, a century after it defined amusement, one way or another Coney Island is still having fun. Its huge parks are gone, its crowds have dropped dramatically. But last year, five million people rode the subway there and no one knows how many millions drove in. Cheap thrills haven't gone out of style. In order to counter the gangs and recent crime that had rivaled Coney's "Sodom by the Sea" days, a beefed-up police presence is everywhere on the Boardwalk. Strolling its planks, men still suck in their stomachs, and women still strut. Couples still cuddle under the Boardwalk. On warm days, it's still crowded along the shoreline. And above the ocean's roar, you can still hear a barker calling. "Ladies and gentlemen, boys and girls. Welcome to the most amazing show at Coney Island. See the strangest, the most unusual curiosities. It's bizarre! It's unusual! Hurry along now. Step right up. You're just in time!"

Yale School of Drama grad Dick Zigun (with cigar) poses with Zinobia the Bearded Lady and Koko the Killer Clown at his Coney theater, Sideshows by the Seashore.

COMEDY ISLAND USA
PRESENTS

It's thi

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Intrepid The New Dodge

By John F. Ross

A few miles of land arose from the sea—and the world changed

Panama is an event as well as a place. Smithsonian scientists are learning what it has meant for continental animal swapping, shrimp evolution, ice ages and Europe's climate

Marine biologist Nancy Knowlton gathers chunks of dead coral from which to extract live snapping shrimp. Behind her is the Smithsonian's research station in the San Blas Islands, built on and out from a sandbar.

Long after the death of the dinosaurs, but well before the emergence of humans on earth, the continents of North and South America lie separated by a deep and formidable sea. Underneath the waves, however, gigantic blocks of earth's crust grind against one another. This violence begets a string of volcanoes and islands breaking the surface like the plates along the back of a stegosaur. Eons pass, more land rises out of the sea. A land bridge now connects North and South America for the first time in tens of millions of years, and the animals from each continent intermingle. Nineteen-foot-tall sloths and 12-foot-tall predatory birds move north, while bears, horses and deer go south. In the oceans the opposite has happened. Populations of marine animals are now separated by the land barrier; many evolve into distinct species. Three million years pass, then humans use this corridor to colonize the Americas all the way to the pampas of Argentina and the fjords of Chile.

This is how conventional wisdom has recounted the rise of the Panamanian isthmus. Now, new research suggests a story far more global. The west-moving equatorial current had to turn north, eventually becoming the Gulf Stream and paradoxically triggering ice ages even as it warmed what is now Europe. What had been one ocean is now two, the Pacific and the Atlantic becoming very different, almost opposites.

Much of the work has been done at the Smithsonian Tropical Research Institute (STRI) in Panama. "We're looking at the rise of the isthmus," says STRI's Tony

Photographs by David W. Harp

Tony Coates is both a staff geologist and the deputy director of the Smithsonian's Panama operation.

Coates (above), "as perhaps the single most important natural history event since the death of the dinosaurs 65 million years ago." The narrative now reads that the rise of the isthmus kicked into gear a chain of events global in magnitude, rerouting ocean currents, profoundly altering Europe's climate and catalyzing ice ages.

In a series of laboratories on the island of Naos in the Bay of Panama, adjacent to the Pacific entrance to the Panama Canal, geologists, paleontologists, ecologists, botanists and anthropologists each add pieces to the story. (STRI's new Center for Tropical Paleoecology and Archaeology is due to open this month in Panama City.) Few examples in science so elegantly reveal the dynamic relation of earth's physical wonders, its geology and weather, to its life-forms, particularly the patterns of evolution and human development.

(Because the chronology of events was so little understood, scientists at STRI set up the Panama Paleontology Project. This is a worldwide network among scholars that provides a database for all the scientific disciplines to use in the study of the environmental and biological history of the isthmus.)

It's hard to imagine the importance of the isthmus by looking at it on a map: a shaving of ham between two huge rolls, the Pacific and the Atlantic. At its narrowest, the section between Colón and Panama City, the isthmus is only 40 miles wide and, not coincidentally, is the locus of the Panama Canal. A little more than 1,000 miles due south of Miami, the isthmus writhes like a snake along an axis running east to west, connecting Colombia to Costa Rica. My impression of the isthmus as insubstantial dissolves in only a matter of hours once I arrive in Panama. That's enough time to drive a confusing northwest direction from the Pacific Ocean at Panama City to Colón on the Caribbean. The semiarid Pacific coast gives way to dense rain forests and rumpled, cloud-covered mountains. We pass over the mighty Chagres River, which cuts through the jungle and whose lower course serves as part of the Panama Canal (SMITHSONIAN, November 1991). The Caribbean side brings warmer, shallower waters, large coral reef systems and mangrove-rimmed islands.

Tony Coates is an ebullient man with a toothy smile and twin responsibilities at STRI as its deputy director and a research geologist. When he started working in Panama in 1986, the country's geological map had huge white blanks all over it. "You bet I was happy," he grins. "I grew up in England where every rock outcropping has had thousands of geologists crawling all over it long before I came along." But working out the geology of the tropics is no picnic, I learn. Central American geology is some of the world's most complex, largely because it forms the sloppy intersection of five tectonic plates, the immense and slowly moving pieces of earth's crust that form the continents and ocean floors. Research is difficult because many of the clues—the rocks and strata—lie underwater. We live in a warm spell between periods of glaciation; in the past 20,000 years, water once locked in the polar ice caps has raised the level of the oceans by 430 feet. In rare instances, tectonic activity has pushed the land up faster than the rising water, preserving the geologic record. One such place is Bocas del Toro, on the Caribbean coast, a remote forested province in the northwest corner of Panama characterized by an archipelago of sparsely populated islands. It's to these islands where waves and weather have stripped away layers of time that Coates takes me.

STRI doesn't own a field station here, so Coates hires out a small cabin built on stilts over the water in a tiny Indian village, three dozen miles by boat from the town of Bocas del Toro. Hidden reefs make getting there tricky even for Coates, who's spent many months in the area. Behind our primitive cabin lie a handful of huts with thatched roofs, one of which is a school. Each morning we awaken to see the quiet procession of Guaymi children paddling their dugouts to school. Some appear to be only 4 or 5, yet they all handle their tippy canoes with confidence.

When I see those dugouts, as we head out to see some surrounding islands, I feel that we're cheating with our 22-foot Mako with 125-horsepower twin outboard engines. But I lose that concern quickly. It's July and the rainy season is in full swing, pouring as much as nine feet of rain in a few short months. Rain douses us with

John F. Ross wrote about STRI's temperate-zone counterpart, the Smithsonian Environmental Research Center on the Chesapeake Bay, in July.

such ferocity that I find it hard to breathe. Coates slows the engines, still clenching a dripping cigar in his teeth. Finally the rain stops. We anchor off Cayo Agua, an island on the western tip of the Valiente Peninsula, and swim to shore, wading gingerly to avoid sleeping stingrays in the silty water. At the end of a beach overhung with sea-grape trees lies an outcropping of rock. Here unmistakably are corals that Coates believes are five million years old. A dull yellow, they bear striations and look organic even to my untrained eyes.

Racing back to the boat before the sand flies enjoy a second course, Coates explains that finding the coral was surprising to him at first. "Conventional wisdom," he says, "proclaimed that the isthmus rose three million years ago, split the ocean in half, and then these oceans developed their distinctive qualities." In the Atlantic that meant shallow, nutrient-poor water and the growth of coral reefs. "Coral needs shallow water to grow, and the existence of it at five million years ago, along with other geologic evidence," he continues, "suggests that large-scale changes started well before the complete closure of the isthmus three million years ago." By 12 million years ago, the seafloor had risen to within 3,000 feet of the surface, enough to interrupt deep ocean currents. A million years later, an arc of island volcanoes had broken the surface. The shallow water surrounding the new islands made possible the establishment of the early coral reefs.

Fighting surging waves, Coates takes me island hopping. We see lines of basalt from the volcanic eruptions now locked passively into layers in the cliffs. Atop them lie grayish layers of marine sediments. Dipping at crazy angles back into the beach or water, these same layers reappear a half-mile away. To make sense of the different forces at hand requires imagination, a willingness to extrapolate from meager clues on the surface and an ability to visualize not only what lies hidden below the surface but what once lay above and has weathered away to nothingness. To aid him in dating the layers, Coates employs technologies such as paleomagnetism. In the base of one rock cliff, we find four man-made holes each the size of a silver dollar in circumference and sev-

Antonio Montaner

Geologists drill samples of Pleistocene rock from the little that's left of a rapidly eroding island. This is Finger Island in Bocas del Toro (Mouths of the Bull), on the western end of the Caribbean coast.

eral inches deep. In the small cores taken from the holes are millions of bits of magnetite, each of which acts as a compass. Three decades ago, scientists learned that earth's magnetic poles have flipped between north and south many times in geologic history. Before molten rock turned hard or while sediments dropped to the seafloor, the magnetite crystals aligned with the current pole and these magnets became locked into position. By taking a number of samples at strategic locations, geologists can match local patterns of pole orientation with well-established and firmly dated patterns. The work is hard, slow and expensive.

Snapping shrimp in the San Blas Islands

Working out the geology of the isthmus provides a critical template and framework upon which to superimpose the research of STRI biologists. While the isthmus joined the continents, it also cut the ocean in two, cleaving populations of marine organisms. Marine life-forms had the chance to evolve independently. Science has dubbed these sister species "geminates," from the Latin root *geminus*, meaning "twin." To evolutionary biologists studying how new species evolve, the rise of the isthmus becomes experimental biology. For the past half-dozen years, STRI's Nancy Knowlton has studied snapping, or pistol, shrimp populations split by the isthmus. We fly along the Caribbean coast to the San Blas Islands, where STRI has a marine field station. The station, a series of rooms built atop pilings anchored to a patch of sand no bigger than a volleyball court, resembles a weathered ghost ship run aground. A steady wind whistles through holes in the bamboo cabins, giving the unsettling sensation that the entire station could drift out to sea at any moment. Knowlton had a far more unsettling experience here seven years ago during the U.S. invasion of Panama. Strongman Manuel Noriega's soldiers kidnapped her and her 4-year-old daughter from the field station, forcing them onto a boat before her daughter could put on shoes or change out of her nightgown. A daylong forced march along a rugged road through the jungle on the mainland blessedly ended in their release.

Knowlton is one of the world's foremost experts on snapping shrimp, typically penny- to half-dollar-size crustaceans that are ubiquitous in tropical waters. Their trademark snapping sound is audible if you stick your head underwater and listen carefully. Some species prefer shallow-water haunts near mangroves, others the deeper and clearer water farther from shore. One of their habitats is inside coral, both living and dead: finding them is a laborious process. On the dock at the field station we haul buckets of basketball-size chunks of dead coral from a small boat. In moments we're dirty with bits of coral from splitting it with chisel and hammer. We can hear the shrimp inside the coral snapping angrily as we invade their homes. The dark and colorful exterior where seaweeds, tiny sponges and anemones grow gives way to an interior the color of angel food cake and riddled with cavities and tunnels where the shrimp hide. Brittle stars, a feisty red crab and even small fish fall out onto the dock.

We find two shrimp and place them in a petri dish with a pair of a different species of shrimp we've caught earlier. Immediately the males square off, snapping, feinting and wielding their club-like claws in a frenzy. "See the candy-striped one?" Knowlton says. "He's snapping his claw to send jets of water at the other guy." It's this belligerence that gave Knowlton an idea.

Over and over, Knowlton placed two shrimp of sister species from the Atlantic and the Pacific in small dishes to see if they would mate. "It was tedious," she recalls, "but we counted each snap they made during a 20-

The Panama land bridge made possible one of the great events in biology—the interchange of species of two continents. Moving into South America were 1) fox; 2) deer; 3) tapir; 4) spectacled bear; 5) spotted cat;

and 6) llama. Flying north were 7) parrot and 8) toucan. Following on foot were 9) armadillo; 10) giant sloth; 11) toxodont; 12) howler monkey; 13) paca; 14) giant predatory bird; 15) anteater; and 16) capybara.

minute face-off." Genetic testing showed a much greater molecular divergence among those that fought most aggressively. "This tells us," says Knowlton, "that the longer the shrimp had been separated by time, as measured by the amount of difference in their genes, the less likely they were to mate." As it turns out, no shrimp across the isthmus mate readily—they are all now separate species.

Knowlton found that these shrimp had not all diverged at exactly the same time, but over a wide range of time, as far back as 12.5 million years ago. Her work in biology mirrored Coates'geologic work. "We learned that the rise of the isthmus," he says, "was not so much an event as a process."

Before this revelation, scientists had thought the isthmus had become important only when it completely divided the sea three million years ago. The reality was more complicated. As Coates and Knowlton have learned, the rising seafloor and emerging volcanoes in the seaway had created new shallow-water environments and a wide diversity of new habitats. The Atlantic and the Pacific had already begun to form their distinctive personalities long before the isthmus formed fully.

The water on the Pacific side of the isthmus grew cooler, its upwelling currents carrying rich nutrients, while the Atlantic side grew shallower, warmer and nutrient poor. These conditions supported reef building in the Atlantic and a rich food chain in the Pacific. In fact, the appearance of these new conditions, not so much the erection of the barrier, spawned changes in the shrimp.

Nancy Knowlton's husband, ecologist and paleontologist Jeremy Jackson, makes a contribution to the ongoing dialogue at STRI by analyzing the nature of evolution through the fossil record. Jackson is a tall man with curly hair parted in the middle. He talks to me in his lab where hundreds of clear boxes line the shelves. The whitish, sandy material I find in one box turns out to be, on closer examination, skeletons of tiny invertebrates known as bryozoans.

Working out the time line

In the past, Jackson explains, problems have plagued paleontologists trying to decipher the events surrounding the rise of the isthmus. It's certainly not the lack of fossils. "Coming down here can debilitate a scientist used to temperate biology," says Jackson. He and his colleagues have found nearly 1,300 molluscan genera, the classification one step up from species. The entire East Coast, from Florida to Maine, by comparison boasts only 828 genera of mollusks. "And we haven't come close to collecting all that's out there," Jackson adds. What has been missing is a framework with which to date these fossils. For the first time, thanks to the work of Coates and others, Jackson and his colleague Alan Cheetham of the Smithsonian's National Museum of Natural History have the information they need.

The fossil record reveals that great evolutionary changes occurred about two million years ago. At that time 11 genera of corals suddenly disappeared. The same number of genera had grown extinct before, but this had occurred over a period of 20 million years. One-third of the corals and nearly half of the mollusks simply died out. The extinct species were largely replaced by new ones. Where one genus of coral had appeared in the preceding 20 million years, 21 genera suddenly appeared. "At this point, you get the emergence of the modern reef," Jackson says. The once dominant coral genus—pocilloporid finger corals—dies out. Waiting in the wings were the acroporid staghorn and elkhorn varieties of coral that define our vision of the modern reef.

The root cause for these extinctions and regenerations remains murky. Indirectly, it is the rise of the isth-

Archaeologist Richard Cooke compares a fresh catfish skull with bones found in a dig at Cerro Juan Díaz.

mus. When the sea barrier deflected the strong westward equatorial currents north and created the Gulf Stream, the moist air accompanying the current increased rain in the high northern latitudes, providing the raw material for ice ages. Glaciation, in turn, played havoc with water temperatures and sea levels. Changes weeded out less adaptable species. "Wherever we look," says Jackson, "we're not seeing what Darwin envisioned: the gradual and piecemeal accumulation of evolutionary changes. Instead, major evolutionary changes take place in fits and starts over a short period of time." This is the latest evidence in the debate about how evolution unfolds, whether by gradualism or in sudden bursts, a theory put forward by Niles Eldredge of the American Museum of Natural History and Stephen Jay Gould of Harvard University. To many scientists, Jackson and Cheetham's work provides the strongest evidence yet for the latter theory, known as punctuated equilibrium.

To Jackson, biology is not about gradual and constant changes, but about big events causing massive changes. There are thresholds where one small additional change will throw the whole system into crisis. "There's a strong moral in this story," says Jackson. "We get lulled into a false sense of security with global warming, for instance, because changes of several degrees don't seem to have an immediate impact on life-forms. But, the more we learn about nature being chaotic and nonlinear, [the more we realize that] a further increase of one degree could trigger dramatic events and extinctions."

For terrestrial life, the impact of the isthmus was far more immediate than for marine animals. An animal cavalcade moved over the new land bridge as though a new superhighway were open. From the south came giant anteaters and tank-like glyptodonts. From the north, bears, dogs, weasels, cats and racoons rushed south to exploit a continent where no mammal carnivores lived. In the blink of an eye, animals freely roamed from the plains of North America to the pampas of Argentina. South America had never seen mice; now 60 different species lived there. It was dubbed the Great American Biotic Interchange.

Northern animals prosper down south

Over time, creatures from North America proved better colonizers: only three animals—the opossum, armadillo and hedgehog—survive as southern transplants in the north today. Yet, more than half of South America's mammals trace direct lineage to the individuals from the north that crossed over the Panamanian bridge.

(Two years ago, the seven countries of Central America pledged by treaty to rehabilitate the isthmus so that a continuous biological corridor will once again run between the two continents, in hopes that wildlife can travel along the land bridge as it did when the isthmus first arose. This effort is celebrated in a new book, *Paseo Pantera*, edited by Tony Coates.)

Soon after the bridge appears, the creatures of the north again feel the influence of the isthmus, this time in major climatic changes over and above the ice ages. The strong equatorial currents that once pushed westward through the gap between the two continents are blocked. Instead, this current pushes north and gives birth to the Gulf Stream, the ocean current of warm water that flows north along the east coast of North America and then across the Atlantic. This current moderates the winters of northern Europe. "Without the Gulf Stream," says Coates, "many major European ports, such as London and Stockholm, would be closed by ice and snow for many months each winter." The moist air carried north by the Gulf Stream hastens and intensifies cycles of glaciation in the Northern Hemisphere. Over the past two million years, the planet has felt the impact of the ebb and flow of the great ice sheets of the north. The ice itself never came farther south than the Ohio and Missouri rivers, but it lowered the temperature of both land and sea at the isthmus. One of STRI's paleo-

Why pay for cellular phone service if you only want it for emergency use?

The SOS Phone offers a 24-hour call center to connect you with your emergency roadside service, 911 service or family members in the event of an emergency.

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To tell you the truth, I am not interested in owning a cellular phone...*except for use in an emergency.* What would I do if my car broke down on the interstate or ran out of gas on some deserted back road? How would I get help? Like most women, I have the safety of my children to consider.

Last month, I inquired about cellular phone service. I was surprised to find out how expensive it was, even for the most basic calling plans! I just couldn't justify spending that much for something I may never need. Then a good friend told about a product she thought would solve my problem. It's the SOS Phone—a cellular phone service designed exclusively for emergency use!

What does it do? With the touch of a button, the SOS Phone will connect me to a roadside emergency service, a 911 service or a trained SOS operator, 24 hours a day. If I ever need help, I know it's just a phone call away.

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Tiny but pugnacious shrimp provide a timescale for how long species have been separated by the isthmus.

botanists, Paul Colinvaux, is reconstructing the climatic and vegetational history of the tropics by studying ancient pollen grains. He has determined that when the land bridge formed, temperatures were colder by nearly 11 degrees Fahrenheit than they are today.

"By about 11,000 years ago," says STRI archaeologist Richard Cooke, "Paleo-Indians from Asia came south through Panama." At that time, large mammals, from horses and camels to mastodons—virtually all large herbivores—suddenly went extinct. "The timing of these extinctions suggest that human hunters had a great deal to do with these extinctions," he says.

Cooke, who calls Panama home, has dug sites in central Panama over the past 25 years. He takes me out to Cueva de los Vampiros—Vampire Cave—near the town of Aguadulce. On the Pacific's Parita Bay, three hours' drive southwest of Panama City, the drainage area of the Santa María River contains some of the most productive ancient sites in Panama. For thousands of years, the cave sat on a little forested knoll surrounded by wide and largely lifeless salt flats. The ancient landscape has all but disappeared. To get there today, we drive atop earthen dikes separating many large, shallow pools of water in which shrimp are being raised. On the way in we pass catchment basins dug out of the ground. Aware that Cooke is an archaeologist, nervous construction engineers try to divert us: the ground here is littered with thousands of pieces of pottery. We find Vampire Cave unmolested, except that all the vampire bats have been smoked out. In the dirt floor of the cave lies a hole the size of a pool table and the depth of a grave. It is a test excavation that Cooke and his colleagues made in 1982. Here they discovered stone implements and fish remains dating back 8,600 years. "You have to imagine this site when it was an island in a river," says Cooke, "and much closer to the sea."

Cooke's colleague, paleobotanist Delores Piperno, has found even earlier evidence of human occupation through a relatively new technique, the study of phytoliths. Literally "plant stones," phytoliths are microscopic deposits of silica inside the cells of plants. It's phytoliths that make grasses hard to chew and have caused cows to evolve large grinding molars. Fortunately, these silica deposits form distinctive casts of the cells of the host plant and are visible under a microscope. Long after the organic material has rotted away, these tiny casts leave a history of plant and tree life. In the sediment of an ancient lake about 40 miles from Vampire Cave, Piperno and her colleagues found a record of human modification of the environment that started 11,000 years ago and ran for the next 10,000 years. Burned phytoliths and microscopic pieces of charcoal in great numbers indicate that early settlers practiced slash-and-burn agriculture. By 7,000 years ago, a domesticated corn-like plant (maize) appears. Four thousand years ago, phytoliths from trees and woody plants are rare, suggesting that the indigenous people have substantially cleared the rain forest. "This evidence supports the picture I'm assembling in my digs," says Cooke. "Panama wasn't just a passageway between the continents and large civilizations to the north and south, but a highly populated region."

By 350 years ago, the phytoliths show, the forests suddenly reappear. It occurs after the colonization by the conquistadors. Here is a chilling sign of the impact of the Europeans on native peoples. Ravaged by disease, sold into slavery and dispersed, the indigenous population is so diminished that it no longer stresses the environment, so the vegetation grows back.

Richard Cooke slowly assembles a picture of life on the isthmus, although the limited number of sites excavated makes generalizations difficult. Tantalizing clues emerge piecemeal from his active site at Cerro Juan Díaz, a place that was continuously occupied by Indians for 1,500 years, through the time of Spanish contact. Cooke and his colleagues have found 60 human burials spanning many centuries. High-status items between the fifth and seventh centuries A.D. are jewelry crafted from imported shells. By 700, the graves contain gold work and polychrome pottery. Not long before I visited, archaeologists discovered a series of human mandibles placed inside a circular row of pots. Their significance remains a mystery.

A theme of interest to Cooke is the reliance of early indigenous people on the sea. To learn what they might have caught, he's set up intertidal traps and caught estuarine fish. He's even become a frequent visitor at the home of Francisco Villarreal, a Panamanian fisherman who still preserves fish the traditional Indian way. A toothless old man with large brown ears that stick out from his head, Francisco collects the fish that nobody wants, often finding them dumped on the shore. He guts, dresses and drops them into a tank of brine. A few days later, he pulls them out and dries them in groups on a clothesline. There are catfish, grouper, barracuda and dozens of small estuarine fish. He'll sell a string of three or four fish for 30 cents to Indians in the interior. Cooke oversaw an Israeli grad student who documented damage to the fish bones from Francisco's knife. With such data, Cooke can study bones from ancient trash piles to find clues to fish preparation.

After two weeks of thinking in broad sweeps about earth's history, I imagine Francisco's forebears chopping up fish, perhaps living in Vampire Cave. Imagining farther back, I see them barely weathering the coming of the Europeans. I see Francisco's long-distant kin crossing over the isthmus for the first time, chasing odd-looking mammals to extinction. I think of the immense glaciers scraping the north, the emergence of two oceans, and the rising of the Panamanian isthmus that directly and indirectly shaped many of these events like a tossed stone disrupts a quiet pond.

It's only then, batting away flies and with the stench of fish in my nostrils, that I understand the significance of the work being done at STRI. The scientists there have opened a window into nature's inner workings, revealing a world formed by violent and catastrophic events in geology, climate, biology and humankind—all interdependent and dynamic. "You can't think about the world as marked by order and precision anymore," says Jackson. "The more we learn, the more we find it chaotic, unpredictable and complex." It's a vision that makes science scary and difficult, but also wildly exciting.

At the end of the day, Knowlton writes up her notes by the light of a lantern. Behind her is Nalunega, an island to which cruise ships bring tourists to buy molas, the reverse appliqués made by Kuna Indians.

In 1838, at the age of 34, the magnetic Sand had already won herself fame and fortun

By Robert Wernick

A woman writ large in our history and hearts

The free-spirited author George Sand scandalized 19th-century Paris when she defied convention and pioneered an independent path for women

In her hideaway at Nohant, Sand made her first attempt at a novel.

It can be plausibly argued that one of the critical steps toward the emancipation of women and the expansion of their world was taken one afternoon in November 1830, at the lovely chateau of Nohant in the center of France. Today, thousands of pilgrims visit that literary shrine each year, arriving from the world over to pay their respects to the famous writer who spent half her life there, George Sand.

The visitors find everything so peaceful here, the 18th-century architecture so airy and comfortable and elegant, the dining table set so properly with its place cards for M. Flaubert and M. Turgenev and Prince Jerome Napoleon. The walls are so stately with their family portraits and pale-blue paper, the views so lovely of the rich fields and woodlands of the old province of Berry, that it is hard to associate this gracious place, recently subject to a loving restoration, with a revolutionary event. George Sand's stand for freedom, taken in these spacious rooms, could be said to have had greater consequences than that year's uprising in Paris, which had overthrown the last of the Bourbon kings.

George Sand was not yet George Sand in 1830. She was the baroness Aurore Dudevant (née Dupin), 26 years old, a handsome, hot-blooded, thoroughly unhappy woman living with her husband and two little children on the estate she had inherited from her grandmother. She was rummaging through her husband's desk that day, looking for some paper she had misplaced, when she came across a bulky envelope with her name on it and written below it the words "Only To Be Opened After My Death." Since it was addressed to her, she saw no reason not to open it. The missive turned out to be full of violent abuse, all the resentments and disapprovals that had been simmering for the eight years of a marriage between two people who had nothing in common.

It was perhaps the pretext she had been looking for; in any event, something snapped inside her at that moment. She summoned her husband and told him that she was tired of living with a drunken oaf who fell asleep when she talked about books or played the piano, and that she was moving to Paris to make a living there by writing books. She would live her own life in her own way. She needed his consent to do it, for though the property and most of the money was her own, the law decreed that a married woman was incapable of handling her own business affairs and that all the checks had to be signed by the husband. This particular husband was a great hunter and a heavy drinker, but he was no match for her in character. She bullied him into accepting her terms and giving her a small allowance when she went off to Paris. He could have had no idea that he was helping to inaugurate a new era in human history.

Within a few weeks, the baroness had packed her bags and kissed her children goodbye. (She and Casimir would manage to share custody of the children for a while; eventually, they would live with her.) She took the diligence for Paris, where she attracted immediate attention by wearing masculine attire, featuring trousers, top

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A fish home made of steel accelerates the growth of fish food by giving off iron ions, critical for photosynthesis of plants.

Fish Like Steel-Frame Homes

By Tomoyuki Kohara

Japan's biggest WWII battleship, the *Yamato,* was sunk at the end of the war and now lies at the bottom of the East China Sea. According to anglers in the area, the sunken hulk of the *Yamato* has now become home to large schools of kelp groupers, some close to two meters in length. This makes fishing in the area a dream-come-true for fishermen.

The most popular type of old vessel among fish is the steel ship. Fish prefer steel, not because it makes a good sturdy home, but because the constant exposure of the steel to the sea water causes the steel to give up iron ions (Fe^{++}) to the water. This makes the water around a sunken ship rich in seaweeds and phytoplankton which in turn creates an abundant food supply for fish.

The reason for this is that iron ions constitute an indispensable part of the electron transport system that is so important in the photosynthesis of plants. In the absence of iron, a plant is unable to acquire energy by photosynthesis. Steel boat hulls, which are abundant sources of iron ions, thus make good breeding grounds for fish insofar as they also constitute perfect environments for the growth of the plants that serve as the fish's food.

In Japan, the state is taking the lead in the creation of what might be referred to as artificial reefs to increase the overall size of the country's marine resources. Such artificial reefs come in all shapes and sizes ranging from pyramids to building shapes, with some standing more than 10 meters in height. An artificial reef with a height between 1/9 and 1/10 the depth of the sea in which it stands can generate an up-current of water that makes a more favorable environment for fish. Ironically, we are building structures the size of battleships, not for floating, but for submerging to act as living environments for fish.

About the Author:
Tomoyuki Kohara is a science journalist who is interested in the materials of the life sciences, global environment, and ecosystems. He earned a master's degree from Hokkaido University in piscatology.

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A legacy from grandmother Aurore de Saxe helped Sand achieve freedom.

hat and cravat, a sight calculated to turn heads anywhere. Almost immediately, she began selling articles and short stories to newspapers and became an active member of a hitherto all-male circle of talkative, turbulent students and artists. She was living in rooms overlooking the Seine with a curly-haired young man named Jules Sandeau; they had met at a party the previous year and Sandeau had told her that he was a writer.

They agreed to collaborate and in short order had written two novels that were snapped up by a publisher. Sand did not want her given name on the title page, for the public would not take such a book seriously, and so they concocted a joint asexual pseudonym, J. Sand. When she realized that she was doing most of the work, she decided to strike out on her own.

She produced a remarkable novel called *Indiana*, about a beautiful young bride married to a dull brute. Her heroine is wooed by a cynical cad for whom she is willing to sacrifice all, but he prefers instead to make a safe and conveniently profitable marriage. In the end, she discovers her true love and disregards opprobrium in order to run off with him. Indiana, wrote Sand, represented "Choice at odds with Necessity; she is Love blindly butting its head against all the obstacles set in its path by civilization."

A friend suggested that she might lure all the J. Sand fans into buying the book by changing a single letter, which no one would be likely to notice. So the author's name became G. Sand, and the *G*, she decided, would stand for George. It was the name by which she was to be known forevermore. *Indiana* was an instant success. She wrote another novel, and then another.

That was to be only the beginning of her aspirations.

The pants she wore were primarily a matter of practical convenience: you could not work in newspaper offices and run around with all the bright young writers and artists or even sit in the orchestra at theaters (ladies were supposed to sit in expensive boxes) if you were hobbled by ballooning skirts. They were also, like the cigars she smoked, an unmistakable signal of revolt: they announced her intention to turn law and society and traditional modes of thought upside down and put an end to the age-old tyranny of men over women.

She was going to live like a man, make money like a man, have love affairs the way every famous man from Saint Augustine to Lord Byron had done, and do it all without giving up any of what the world regarded as traditional feminine attributes: she would be a good cook and housekeeper, managing half a dozen servants and a sizable estate. She would be a good mother, and she would be flighty and flirty, letting emotion run her life when the right lover came along.

She was only trying to be completely honest and completely independent: "I ask the support of no one, neither to kill someone for me, gather a bouquet, correct a proof, nor to go with me to the theater. I go there on my own, as a man, by choice; and when I want flow-

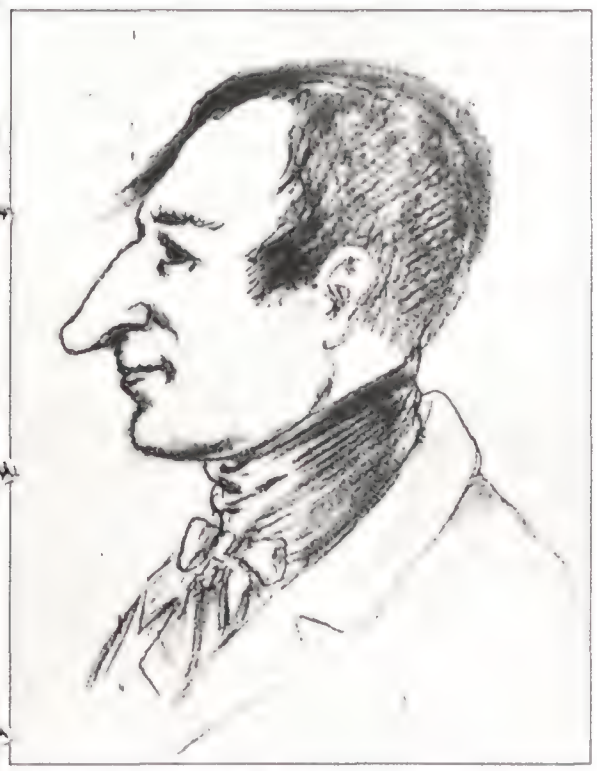
Frequent contributor Robert Wernick has written recently on sound bites and on the nativist political party of the mid-1800s, the Know-Nothings.

ers, I go on foot, by myself, to the Alps." After all the millennia of female servitude, she would be Spartacus showing the way to freedom.

She was not quite as radical as she sounded to the horrified conservatives of her day. She did not propose to do away with marriage; she only wanted the wife to have equal rights with the husband. She wanted marriage to stop being a business arrangement between families and become a loving union between two human beings.

Since she was a child of the Romantic Age, she had high standards for love. She maintained that life should be ruled by emotion and instinct, by the heart rather than the brain. In practice, however, she was not quite that simpleminded.

She would follow her heart anywhere, but the love she dreamed of had to involve the complete "embrace of twin souls." Such accords and embraces were as hard to come by in the 19th century as they are in the 20th, and it is no wonder that her love life was marked by a series of disillusionments. So was her political life, where her hatred of oppression and poverty led her to join revolutionary causes with boundless enthusiasm, only to find that when her heroes came to



Sand's husband, Casimir Dudevant, never understood her aspirations.

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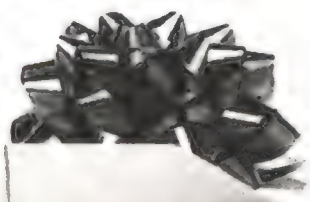

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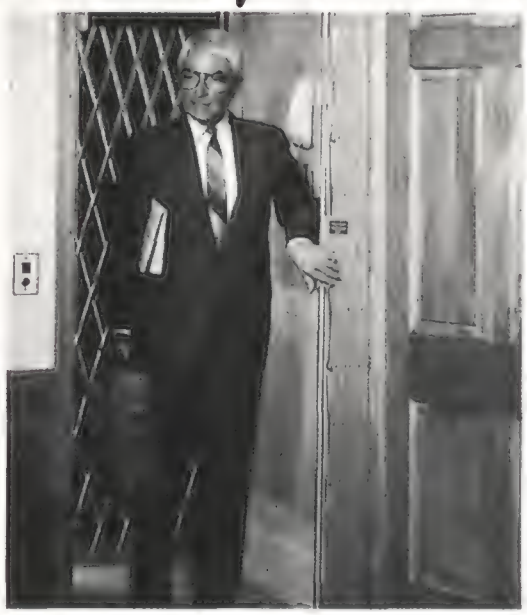

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Poet Alfred de Musset sketched Sand in 1833, the year their liaison began.

power, after years of shouting for the people, they soon began to think only of Me Me Me.

Underneath the swirling tides of her romantic impulses was a bedrock of common sense. Where other Romantics like Lord Byron and Alfred de Musset would turn from unattainable ideals to cynical debauchery and early death, she had the capacity for looking over her ideals coolly and, finding them wanting, going on to something else. But she never lost her faith that the future was brighter than the past and that the future did indeed mean freedom. "My profession," she said, "is to be free."

A proposal to live by this code was amazing enough coming from a somnolent backwater in the hidebound society of early 19th-century France. Still more amazing was that she got away with it. By the time she died in 1876 at the age of 72, mourned by adoring grandchildren and local villagers, she was universally recognized as one of the giant figures of the era. Though little of her vast output is still read today, she counts as one of the notable writers of France.

She understood, cannily, that literature was one of the few domains where women had the slightest chance of getting ahead in the world. There was no hope in the church or the state or commerce, but there was a long if subdued

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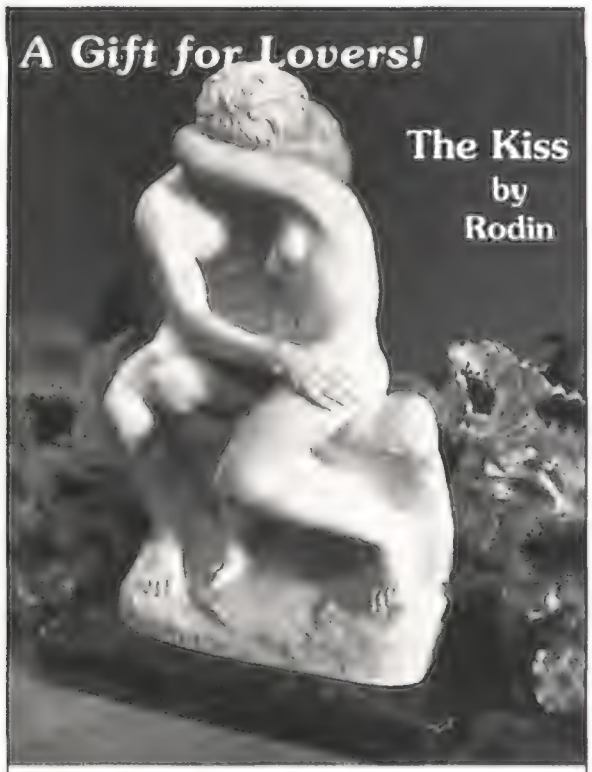

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tradition of women in the arts. A handful of successful women novelists had received grudging recognition: Fanny Burney, Madame de Staël, Jane Austen. They had all operated on the sidelines.

Aurore Dupin was going to get into the thick of the professional literary world. She knew she could write well and she had plenty to write about. Few novelists have had so much family and youthful background to draw upon.

On her mother's side, she came from the back alleys of Paris, where her grandfather had peddled birds. On her father's, she was related to the last three Bourbon kings of France, through her great-great-grandfather Frederick Augustus, elector of Saxony and king of Poland. By his favorite mistress, Countess Aurora von Koenigsmark, the most beautiful woman of her time, Augustus produced the most famous of his 360 or so illegitimate children, the Maréchal de Saxe.

De Saxe was one of the most successful of French generals—there is a great broad avenue named for him in the heart of Paris. He in turn had numerous offspring, including one Aurore de Saxe. She married a rich tax collector named Dupin de Francueil and became one of those handsome, free-thinking, art-loving aristocratic ladies who set the tone of French life in the 18th century. She was a friend of Voltaire and Rousseau; she used to tell her granddaughter that, in the days before the revolution, living well was an art: everyone went on enjoying good food, savoring intellectual conversation, delighting in good music every day of their lives. (As her granddaughter observed, it was a great life if you were assured of a steady income of 500,000 francs a year.)

Aurore de Saxe had one son, Maurice, who served in the military, fighting for the revolution and for Napoleon. After the battle of Marengo he met up with the beautiful Sophie Delaborde, who had made what living she could in cabarets, dancing and meeting army officers. He married her a month before the birth of their daughter, and despite the efforts of his mother to annul the marriage, the little girl was born with an honest name, Aurore Dupin.

By the time she married the baron Casimir Dudevant at the age of 18 in 1822, Aurore Dupin had lived in a Paris garret, in her grandmother's chateau, in a palace in Madrid (when her father was aide-de-camp to General Murat, who had just gobbled up Spain for his brother-in-law Napoleon Bonaparte). She had, from afar, witnessed a battle and seen Napoleon review his troops. She had experienced the tragedy of her father's death: he had been killed when his wild Spanish stallion threw him against a tree near Nohant on his way home one night. She

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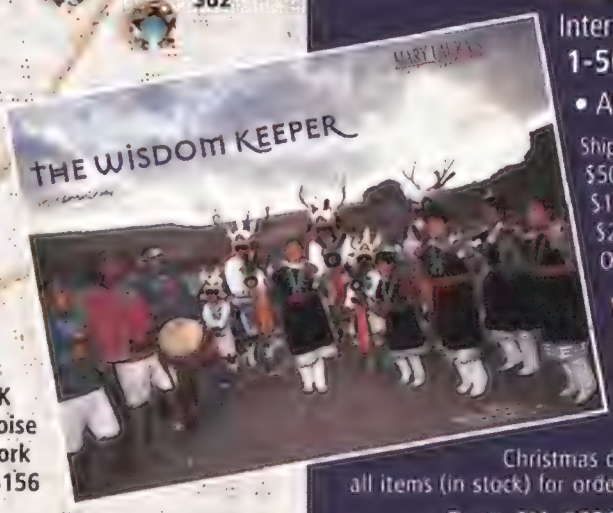

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had fed pigs with the neighboring peasant children and had spent three years in a school for young ladies of good family run by English nuns in Paris.

The convent was the very place inhabited by her grandmother during the Reign of Terror. Then it was a jail, and Madame de Saxe was locked up there. (One day, or so one story goes, her 15-year-old son had come to whisper to her how he and his tutor had crept in the dead of night to the apartment from which they had been expelled, and had detached the seals that the police had put on the doors. They searched out and burned compromising documents that would have sent her to the guillotine and resealed the doors without waking up a soul.)

Aurore Dupin knew how to gallop astride a horse (to the outrage of respectable neighbors who expected her to ride sidesaddle like a lady). She knew how to sew, draw and play the piano. She could speak fluent English and had a command of Latin. And she could tell stories that would hold her mother and her aunt spellbound.

She also had inherited a remarkably robust constitution from the kings and tavern-keepers who were her ancestors. She could walk for miles in a day and delighted in hiking the Alps. In

Sand and Musset, romantics both, foundered on passion, parting in 1835.

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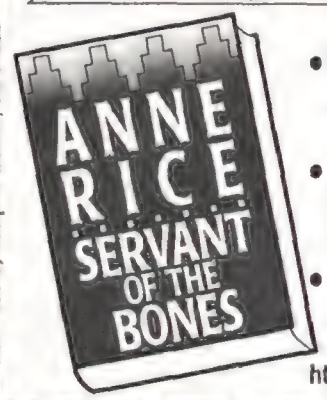

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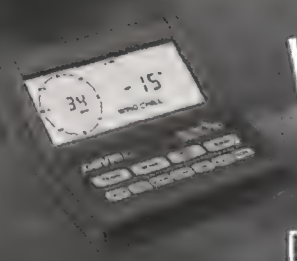
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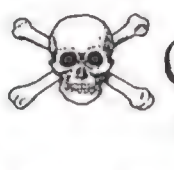
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her later years, she swam in the Indre River at what was then the very advanced age of 70.

She had a truly extraordinary capacity for work. Whatever was going on at any time in the breakneck pace of her complex life—whether it was Chopin or Liszt playing piano in the living room, or revolutionists being shot down on their barricades outside her window in a Paris street, or Jules Sandeau climbing a ladder to her bedroom while her husband snored down the hall, or 18 people coming to dinner—she was never far from her writing desk. She herself might be traversing the countryside collecting plants and flowers or nursing sick neighbors. She might discourse into the small hours with artists, actresses, revolutionary agitators. Or she might design and sew the costumes for her son's marionette theater, or stay up all night talking and drinking and running her fingers through some young poet's hair. No matter: she unfailingly turned out her 20 or more pages a day. Even so, the royalties were hardly ever sufficient to pay for her lavish hospitality, her boundless generosity to friends, lovers, neighbors, political causes.

The work did not exhaust her energy. "Unceasingly I see her hovering anxiously over me," wrote Chopin of the ghastly winter they spent in Majorca, where it rained all the time, where he spat blood and people avoided them like lepers, "nursing me all by herself, for God preserve us from the doctors of that country, making my bed, cleaning my room, depriving herself of everything for me, watching over the children as well . . . add to this, that she continues to write." In fact, she finished a novel in Majorca.

Balzac would write after a visit to Nohant: "She lives almost exactly as I do. She goes to bed at six in the morning and gets up at midday, whereas I go to bed at six in the evening and get up at midnight. But naturally I fitted in with her arrangements, and during three days we talked from five in the evening after dinner, until five in the morning." By keeping such hours, the burly Balzac wore himself out and died before he was 52. Little (barely five feet) George Sand took it all in her stride. She was working on yet another novel (she wrote about 70 in all) when she died in 1876 at the age of 72.

She had written, in addition, many short stories, 24 plays, ten volumes of autobiography, essays, book reviews, political pamphlets and an estimated 40,000 letters, of which 22,000 have been printed. Her complete works now number 160 volumes, and they do not include hundreds of newspaper and magazine articles, or the thousands of lost letters, some of which were burned by their recipients to keep them from the eyes of their children.

She wrote about everything that came to hand: love, adventure, foreign lands and secret societies, Roman prelates and rapacious pirates, corrupt noblemen and hardworking peasants,

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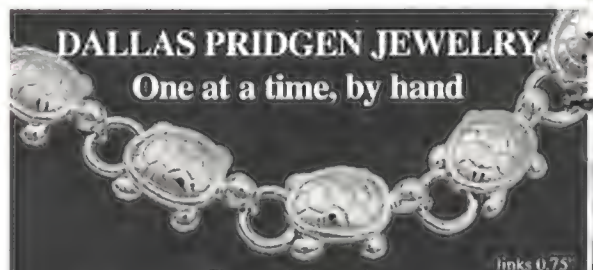

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absolutely anything that she fancied.

In her day she was one of the half-dozen most widely read novelists of the Western world. She was extravagantly admired by people as different as Dostoyevsky, Walt Whitman and Elizabeth Barrett Browning (who wrote two sonnets dedicated to "Thou large-brained woman and large-hearted man, Self-called George Sand!" She was extravagantly denounced as well: by the Vatican, which repeatedly put her on the index of books no good Catholic was allowed to read, and by Charles Baudelaire, who called her a "latrine," a "great fool" and a "stupid creature."

Her reputation as a writer has not stood up very well, and though feminist scholars have revived interest in her works, it is unlikely that she will ever regain the worldwide popularity she acquired in her lifetime. Librarians and booksellers report few requests for her books. She is too long-winded and preachy, her optimism too syrupy, for modern tastes. Witness this passage from *Indiana*, wherein the heroine decries the wrongs visited upon her: "The law of this country has made you my master. You can bind my body, tie my hands, govern my actions. You are the strongest, and society adds to your power—but with my will, sir, you can

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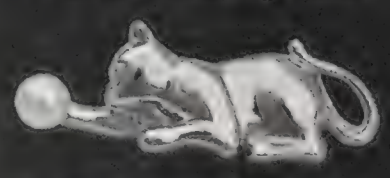

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do nothing. God alone can restrain it and curb it. Seek then a law, a dungeon, an instrument of torture, by which you can hold it—as if you wished to grasp the air, and seize nothing." But there are many unexpected pleasures to be derived from dipping at random into that immense mass of work, for she had a keen eye and a warm heart and a lively forthright style.

She may seem old-fashioned today, a writer of "charming improbable romances for initiated persons of the optimistic class," as Henry James called her, but in her time she was hailed, or reviled, as an innovator, bringing something radically new into literature. She was one of the first novelists, male or female, to treat marriage not as the goal and fulfillment of a maiden's desire, but as a fact of life, which in most cases meant a commercial contract leading to a life of submission and servitude.

She was a trailblazer, too, in dealing with a class of people that had largely been neglected by playwrights and novelists and historians alike: the working poor.

George Sand was among the first serious writers to attempt an account of their lives. She knew perfectly well that, even in a fairly prosperous region

Delacroix's portrait of Chopin depicts the genius who won Sand's heart.

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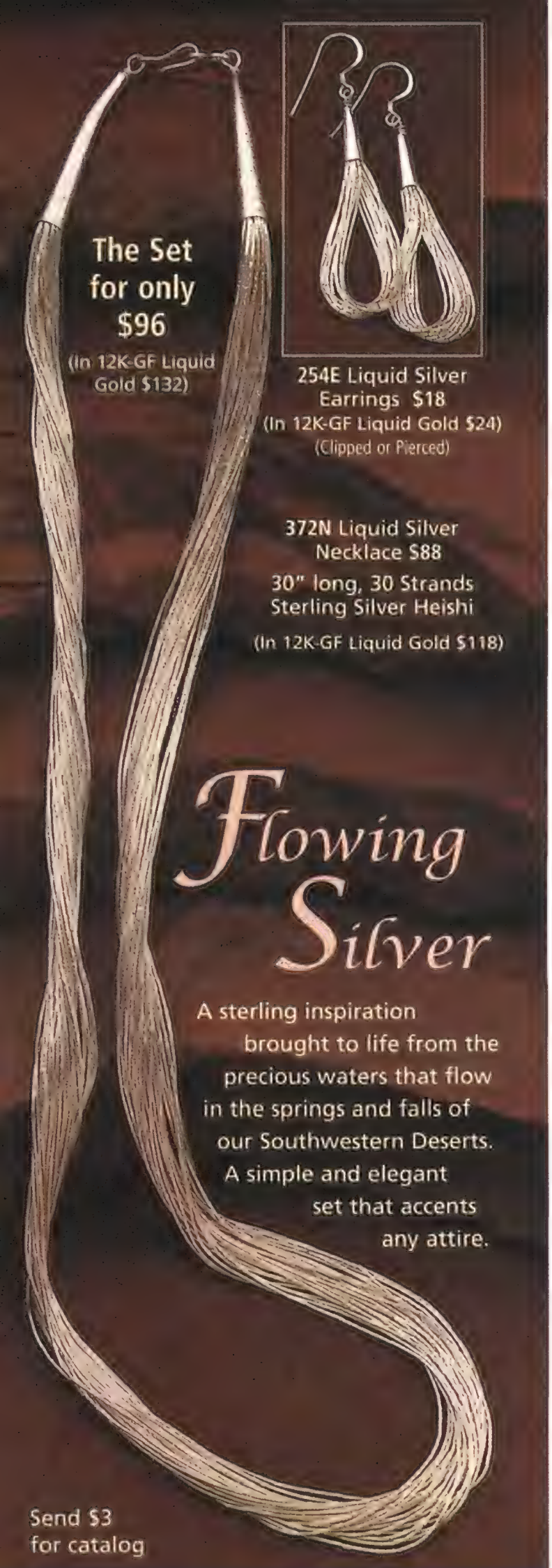
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Pantheon of Sand admirers, lampooned in 1839 caricature, included Chopin (seen as a bird in hand), Liszt (kneeling) and Delacroix (standing behind).

like Berry, the rural poor were condemned to a hard, squalid, stifling life. She didn't dare to show all the squalor, for fear of alienating her bourgeois readers, whom she wanted to make aware of the fundamental decency and dignity of these people. So her picture of the life of poverty is apt to seem sentimental to the modern reader.

She never had the gift for creating unforgettable characters like her contemporaries Balzac and Dickens—at least in her novels, for in real life she did create one character that seems sure to live on indefinitely. That character is, of course, George Sand, a fascinating and complex mixture of passion and reason, wildness and domesticity, frankness and hypocrisy.

In the summer of 1833 she wrote her friend and confidant the critic Sainte-Beuve: "I have fallen in love, and this time very seriously, with Alfred de Musset. . . . You may, perhaps, think that a woman should conceal her feelings: but I beg you to realize that I am in a quite exceptional situation, and am compelled, from now on, to live my private life in the full light of day."

These are words that would come naturally from the lips of any Princess of Wales or Hollywood starlet today. In 1833 they were—for a woman—quite revolutionary indeed.

She was not, like so many of today's celebrities, just putting on a show for the public. She was always following her heart, or her good sense when she realized her heart had led her astray. One way or the other, it made good copy everywhere.

The whole world was watching as she departed with Alfred de Musset, the delicate dandified poet six years her junior, for Italy, land of dreams and desire, from the moment they got aboard a paddle steamer in Marseilles on December 20, 1833. Coldly summarized, the couple's voyage looks as if it had been scripted a hundred and fifty years later by Woody Allen. The Mediterranean was rough, and George strode the deck blowing smoke at the elements. Alfred, who was sick as a dog, wrote a furious little quatrain to protest the reversal of traditional gender roles.

He got his revenge when they arrived in Venice at the hotel Daniel

and George contracted a bad case of dysentery that knocked her out for days. Alfred went out night after night to drink and gamble, and pick up girls along the canals. A handsome young doctor named Pietro Pagello came to bleed George regularly.

Back in the hotel after she was healed, Alfred collapsed with what different biographers describe as typhoid, or perhaps brain, fever. He saw George and Pietro Pagello drinking tea out of the same cup. In his fever he saw much more, and threw a violent jealous fit.

Alfred gallantly went back to Paris alone. George stayed on happily in Venice till summer, then took Pagello back to Paris with her and introduced him to her friends as a famous archaeologist. (As usual, the romance did not work out.) Alfred eventually threw himself back into George's arms. There were passionate midnight meetings, the inevitable Sturm und Drang, and finally they broke up for good.

George, who had written two novels, a novelette and two essays about Venice during her stay there, eventually wrote a book about the whole experience. So did Musset. So did Alfred's brother, and the actress who succeeded George in Alfred's affections. Doctor Pagello lived on in Venice till the age of 91, a local celebrity because of his liaison with the famous, or infamous, George Sand.

Within a month of her finally writing off Musset, she was passionately in love with a married man, a well-known lawyer named Michel de Bourges. Unlike most of her other lovers, he was quite a bit older than she was, and ugly and bald. But he had a golden tongue. He helped win the case against Baron Dudevant for separation (there was no such thing as divorce in France at that time).

But in 1837, less than two years into the affair, she broke things off. She had learned that, among other transgressions, her beloved had already taken another mistress.

Shortly afterward, she sat down to write a letter to herself coolly analyzing the impossibility of remaining at-

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tached to a man who wanted only her devotion and submission, who was not going to leave his wife or his comfortable way of life for her. That was the end of Michel de Bourges, and in 1838 she was willing and ready to take on Frédéric Chopin.

Chopin was a delicate, tubercular, morbidly punctilious, morbidly jealous genius, "frail as a snow-drop," said an American visitor, Margaret Fuller. To him George Sand would play alternately lover, muse, worshipful mother and devoted nurse for eight years. They were the years during which he wrote most of his best piano compositions and she some of her best novels, including the one that has been the most popular down to the present day, *La Mare au diable* (The Devil's Pool). It is a simple tale of love in the Berry countryside, of love triumphant over social convention, which she wrote in four days.

They were also years of squabbles with her daughter, Solange, now an adolescent with a roving eye. When it roved to Chopin and he responded, a tangle of jealousies and resentments ensued, also involving her son, Maurice, and Augustine, a poor cousin whom Sand had adopted. Augustine fell in love with Maurice, to the intense annoyance of Solange. She managed to turn Maurice against Augustine, Chopin against Maurice, George

One constant in Sand's frenetic life was her love for her son, Maurice.

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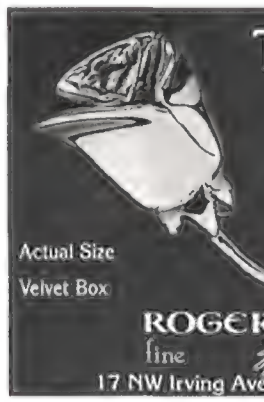
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Sand's scheming daughter, Solange, was often a source of familial discord.

against Chopin. Solange married a ute of a sculptor who once attacked Maurice and George with a hammer. Everyone blamed everyone else, and the affair with Chopin, which might have gone on till his death a couple of years later, petered out unpleasantly.

Political turmoil followed domestic. Revolution erupted in 1848, spurred on by a wide variety of malcontents, from conservative republicans to socialists of various stripes. Sand, sympathetic to the plight of the people, poured out revolutionary rhetoric in countless pamphlets and open letters. A brief republic soon gave way, in a series of stages, to a Bonapartist dictatorship, headed by the nephew of Napoleon I, Louis-Napoleon Bonaparte. Republican and socialist hopes alike were dashed.

But as Sand grew older, she was losing her taste for adventure. She spent more and more time in Nohant, and it was a quieter time than any she had ever known. She had the longest lasting of all her love affairs, 15 years with young painter named Alexandre Manceau, a devoted companion to whom she was very attached. She even left her estate for a time, moving with Manceau to a Paris suburb until 1865, when he died of tuberculosis.

She settled into an active old age at Nohant, playing with her grandchildren, writing and producing elaborate

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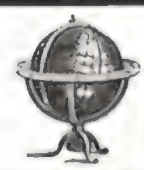

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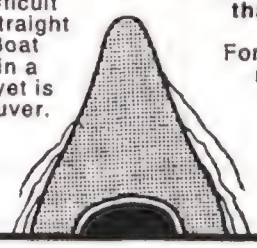

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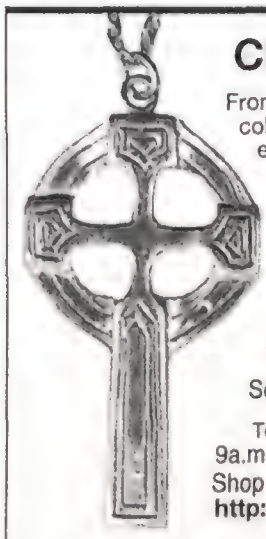

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marionette shows with her son, entertaining guests by the dozen and writing novels steadily. She was an international celebrity by now; people came to see her from Russia, from America, everywhere. And although young people continued to adore her as a standard-bearer of revolt and liberation, her views of the world had calmed down considerably: she had in due course grown to detest radicalism; now she was all for moderation.

She never gave up her capacity to "live life as it is, without being ungrateful, fully aware that joy is neither enduring nor assured." Her last great affection, a purely platonic one this time, was for Flaubert. He admired her wholeheartedly, though he could never understand her taste for playing rowdy practical jokes when he wanted to talk about literature.

And when he wrote to her from the Swiss mountains where he had been sent to calm his nerves, "I am not a *man of nature,* I would trade all the glaciers in the world for the Vatican Library," she snapped back that he himself was a part of nature and he had better get used to it.

Nature was with her to the end. Almost the last words she uttered, when she was dying in agony of an intestinal cancer, were "*laissez verdure,*"—"let greenery"—perhaps because she was thinking for the last time of the great cedar trees at Nohant, planted at the birth of her two children almost half a century before.

If she had a time machine and were to come back to Nohant today, she might find much to displease her in modern life, but Nohant itself would undoubtedly have its consolations. Her house is much the way she left it, and so are the rolling grainfields and woodlands around it. The sturdy farmhouses of her neighbors look much the same; the farmers are little changed, though they now use tractors instead of teams of oxen for their planting.

She would be saddened by the loss of so many traditions: the ox-cart ruts that are now paved roads, the people who have been taught by their television sets to speak French instead of the throaty Berrichon patois she loved.

But then she was a creator of tradition, too, and she would take a generous delight in watching the women drive up on their visits to what is now a national monument, women who may keep house the way she did but also have careers such as she made for herself, as doctors, lawyers, cabinet ministers, professors of gender studies and presidents of international conglomerates. She would recognize them all as her grandchildren. "One day," she had predicted, "the world will understand me, and if this day never comes, no matter, I will have opened the way for other women."

The cedar trees still stand on the grounds of her estate.

Nohant, the estate Sand inherited from her grandmother, was a serene refuge; today visitors will find a wealth of memorabilia in the carefully restored manor house.

Book Reviews

Ruined by Reading: A Life in Books
By Lynne Sharon Schwartz
Beacon Press, $18

As a precocious and retiring 4-year-old, the author tells us, she began reading anything she could lay her hands on. Soon she was immersed in the quirky hodgepodge of titles lining the shelves in her parents' Brooklyn apartment. From the hypnotic, dark cadences of Poe's "Annabel Lee" to the redemptive clarity of *Heidi*, she was hooked for life.

Within a few years, she had forged ahead to Dickens and beyond. "It was," she recalls fondly, "an age of sets," when the "Harvard Classics in black leather and gold trim" offered reason enough to while away an afternoon. She soon discovered the transporting power of Volume 17, containing the complete Grimm and Andersen fairy tales: "They tasted bitter and pungent, like curries."

An enterprising young reader, she remembers, also could glean more practical life instruction from the printed page. *Good Housekeeping*'s monthly column, "Can This Marriage Be Saved?" was avidly followed in many a 1950s household, including her own. The advantages of self-assertion seemed clear: "I had little use for forbearance. I liked a good fight, and . . . wanted the harassed wife to throw her interfering mother-in-law out of the house."

Schwartz's account of her career as a compulsive reader, however absorbing, offers a great deal more than nostalgic reprise. We have, as any number of statistics will confirm, become increasingly a nation of nonreaders, seduced by television and film and the relentless preoccupations of everyday life. The central question she poses is profound and compelling: "Without the voices of my youth, my ghostly familiars," she asks, "how could I have become myself?" The books devoured as a child and adolescent, she reminds us, are formative, touchstones and guides that may endure for a lifetime.

For Schwartz, the special title "that told me more about who I was than anything before or since" was Frances Hodgson Burnett's *A Little Princess*: "I still return to it," she admits, "every few years." Before happening on that novel, Schwartz writes, "I had suspected that the life within was every bit as real as the life without, but no one had ever before reassured me. Sara Crewe, heroic in her rags, demonstrated the fortitude and patience needed until my inner vision could find its way into the actual world."

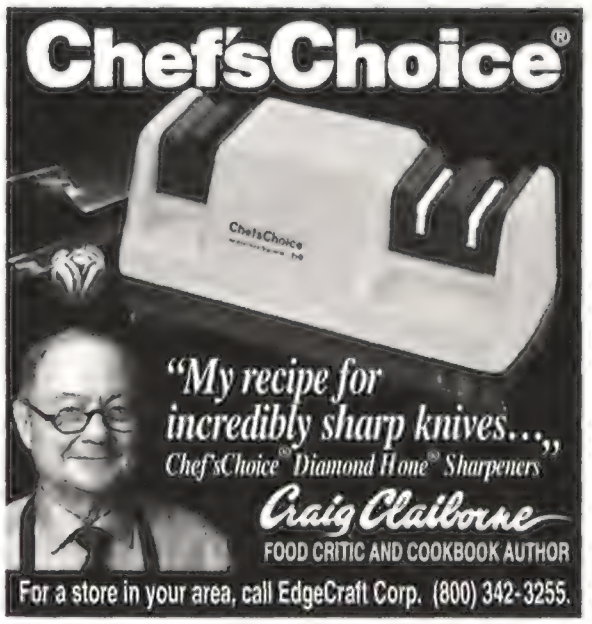
Schwartz, who grew up, not surprisingly, to be a novelist, makes no apologies for a life "ruined by reading" and spent lolling around in armchairs with a beckoning volume. Her excursion, part memoir, part meditation on writers from Erle Stanley Gardner (Perry Mason's creator) to Sophocles, is a call to arms: Couch potatoes, you have only your remote controls to lose. Before you know it, you may find yourself hopelessly addicted, reading *War and Peace*, *A Girl of the Limberlost*, or E. B. White's letters until 3 A.M. For the book, as Schwartz winningly counsels us, remains, even today, an extremely user-friendly technology.

Kathleen Burke is the Book Reviews editor at SMITHSONIAN.

Arguing About Slavery: The Great Battle in the United States Congress
William Lee Miller
Alfred A. Knopf, $35

In the early decades of the Republic, the United States Congress was a deeply flawed institution. In the famous compromise known as the three-fifths rule, the Constitution had allowed slave states to add 60 percent of their servile population to their white electorate in order to determine the number of Congressional seats that each state would have. (Slaves themselves were, of course, denied all legal rights, including the vote.)

The result gave the Southern block up to 40 extra seats in the House of Representatives and effective control over legislation. Slaveholders dominated the rest of the government. They in-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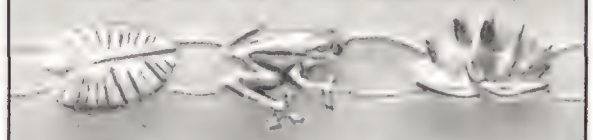

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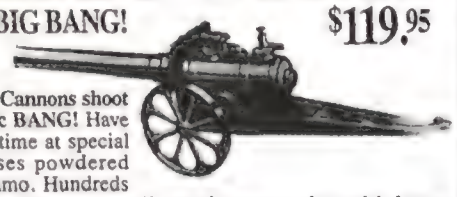

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cluded five of the first seven Presidents (excepting the two Adamses), the majority of Cabinet officers and members of the Supreme Court, and for 28 of the nation's first 35 years, the powerful Speaker of the House.

In the 1830s, those few Americans who actively sought to abolish slavery were treated as a lunatic fringe. As William Lee Miller points out in this often riveting story of the nation's first great political battle over the servitude of African-Americans, slavery was an *interest*, "concentrated, persistent, practical, and testily defensive," while antislavery was a mere *sentiment*, "diffuse, sporadic, moralistic and tentative." Spurred by the Christian evangelical fervor of the era, abolitionism was just beginning to coalesce from a set of privately held beliefs into a political movement that generated a growing stream of books, pamphlets—and petitions.

The Second Amendment's right of petition may today be the least remembered of the Constitution's guaranteed freedoms. However, in the early 19th century, as Miller puts it, "before the nation had marinated itself in modern cynicism about republican government, the modest exercise of signing a petition was the chief way the public made known its sober will to its representatives."

Virtually with a single voice, representatives from the South insisted that slavery was a positive good. As James Henry Hammond of South Carolina unabashedly declared, "I believe it to be the greatest of all the great blessings which a kind Providence has bestowed upon our glorious region." To such men, the abolitionist petitions that increasingly appeared on the desks (they had no offices in those days) of the few sympathetic Congressmen were an outrage. The Southerners' answer to the accumulating piles of petitions was to set about muzzling anyone who sought to challenge the ideology of slavery.

The controversy raged on with rising vehemence for eight years, often dominating all other Congressional business. Ultimately, it proved to be a watershed in shifting American public opinion away from tolerance of slavery, and in the evolution of American democracy itself: "It was one of those moments when a new moral perception swept through the community and a new movement was born. The new moral perception was not only that slavery was wrong—many had been saying that for years—but that its wrongness had the highest priority."

In an effort to suppress the still feeble antislavery forces, Southern Congressmen proposed what was, in effect, an intellectual blockade. They urged federal authorities to allow states to censor literature that they deemed "incendiary," including not only abolitionist broadsides but also a wide range of general magazines, Northern newspapers and religious journals that only occasionally mentioned slavery. Postmasters were encouraged to monitor citizens' mail and remove anything that they deemed related to abolitionism. All petitions to Congress on the subject of slavery were to be automatically tabled, without being printed or referred to in any way.

More shocking still, a gag rule imposed by Southerners and their Northern Democrat allies forbade members to discuss the subject of slavery upon the floor of Congress, under threat of censure. Not only was the enslaved black person denied every freedom but now the white person was even to be denied the freedom to talk about it.

The hero of Miller's story is John Quincy Adams, the only former President in American history to later be elected to Congress, where he served with distinction for 17 years. Steeped from childhood in the hardheaded New England idealism of the Revolutionary era, Adams not only deplored slavery in principle, as many of his contemporaries did, but went far beyond most of them in condemning racial prejudice, which, as he put it, "taints the very sources of moral principle" by establishing "false estimates of virtue and vice."

Beginning in 1836, and for nearly a decade, Adams relentlessly fought the gag rule, struggling to make white citizens see that the South's determination to protect slavery at all costs represented an assault upon their own treasured rights. It was a lonely and humiliating battle, almost without allies. Although a vigorous septuagenarian, Adams was openly scorned as a dotard by his enemies. He was at least twice threatened with assassination. At one point, the ex-President was nearly censured for daring to attempt to submit what his colleagues believed was a petition from a group of Maryland slaves. "Had anyone, before today, ever dreamed that the appellation of 'the people' embraced slaves?" demanded Aaron Vanderpoel

an influential New York Democrat and frequent apologist for slavery.

Adams' enemies desisted only when they realized that censuring him would simply serve to draw more attention to his argument. On another occasion, his enemies threatened to call him before a grand jury for allegedly inciting the slaves of the District of Columbia to rebellion.

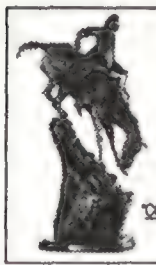
Unbowed, Adams responded: "Let every gentleman, let every member of this House, ask his own heart with what confidence, with what boldness, with what freedom, with what firmness, he would give utterance to his opinions on this floor, if, for every word, for a mere question asked of the Speaker, involving a question belonging to human freedom, to the rights of man, he was liable to be tried as a felon or an incendiary, and sent to the penitentiary."

The gag rule was not overturned until 1844, when the alliance of Northern and Southern Democrats at last began to fissure. But it would take a civil war before the questions raised by Adams were finally answered. Yet, in those debates of the 1830s, tectonic plates had shifted. Adams had shaken the "immense, rooted institution" of slavery as no one had before. The effort to silence Adams and his handful of allies had only intensified popular concern over the moral and political cost of protecting slavery.

As a result, abolition had moved from the margins to the center of public debate. In areas where abolitionists had been treated as fanatics and misfits, said one Pennsylvania Democrat, "they now called meetings to discuss the right of petition and talked about slavery for hours on end." The majority of Northerners, at least, had begun to make the crucial connection that the rights of enslaved African-Americans were indissolubly linked to the freedom of all Americans. From that recognition there would be no going back.

This is not only fine and provocative history. In it lies a message for modern Americans as well: that politics matters, and that even if they fail in their immediate aim (Adams was never permitted to submit a single abolitionist petition), free argument and debate have the capacity to shift our minds for the better.

Fergus M. Bordewich is the author of *Killing the White Man's Indian: Reinventing Native Americans at the End of the Twentieth Century.*



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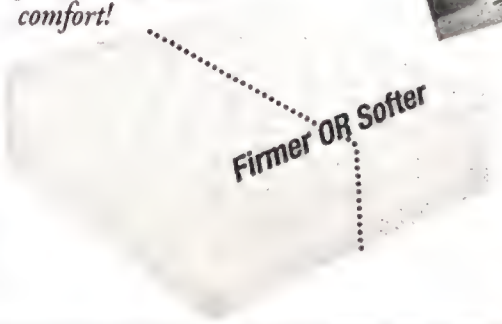

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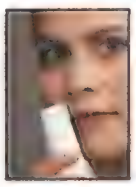

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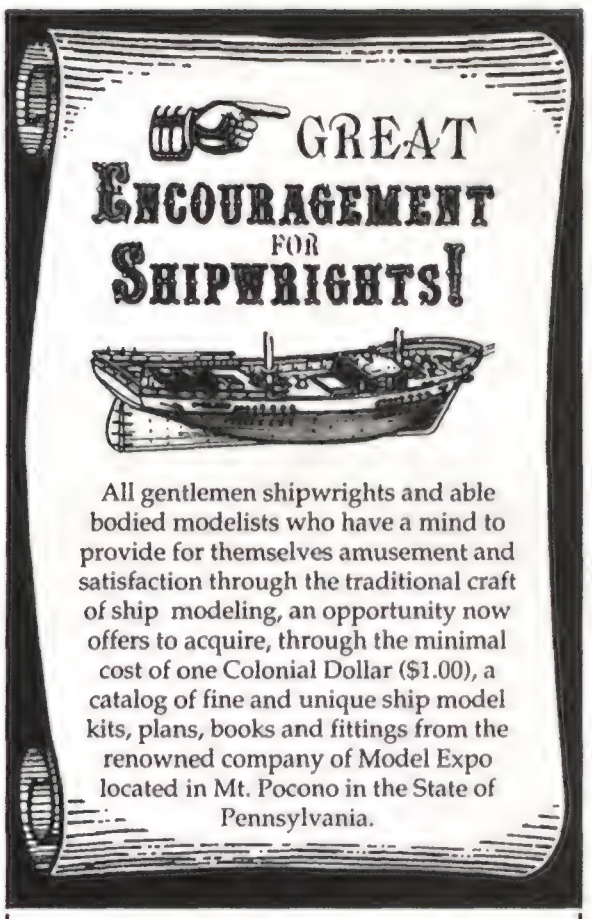
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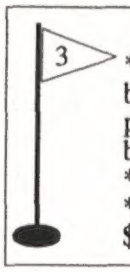

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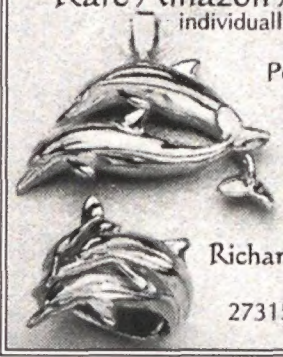

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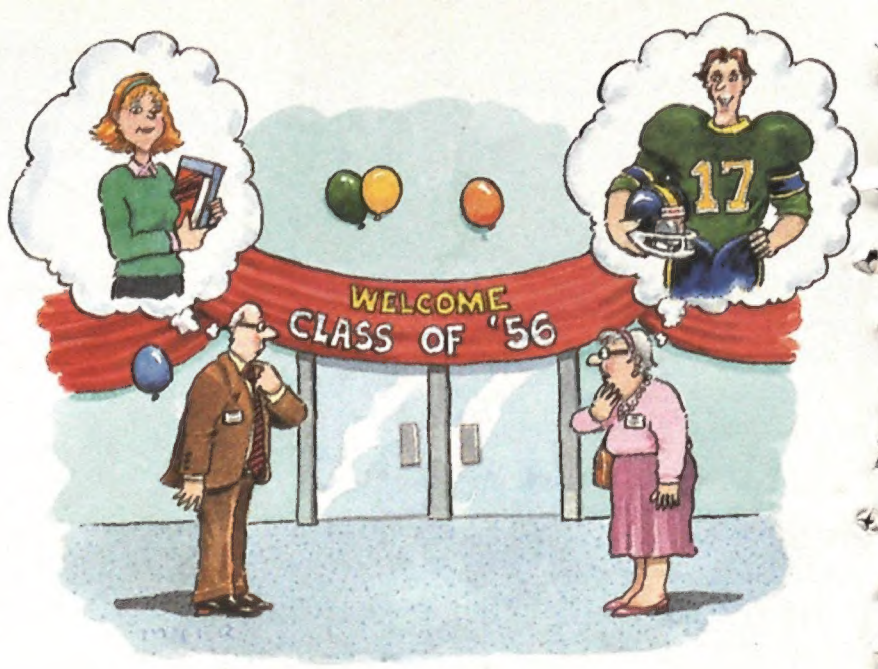
By Jim Doherty

It's great to see old classmates—if you can recognize them



Recently I attended the 40th reunion of my high school class. I had never been to a class reunion, so I was completely in the dark about what to expect.

The venue was supposed to be a country club on the outskirts of town, but as soon as I walked in I knew something was wrong. It was Geezer City in there—wall-to-wall gray beards and white heads. Not a classmate in sight. Weird.

Then I noticed that most of the ancients milling about wore "Class of '56" name tags bearing pictures of themselves from our senior yearbook. Many of those grainy little images looked hauntingly familiar.

Oh the memories! How they all came rushing back! That was the expectation. The reality was different. I could hardly remember a thing.

At one point I was reunited with three grade school chums. Junior reminded me that he and I had played on the baseball team. Susie reminded me that she and I had published a newspaper in Miss Gross' class. When it was my turn to remind Dorothy about something, my mind was blank. Finally I asked her if she remembered the time the two of us emptied a package of cherry Jell-O into Miss Edminister's goldfish bowl. "You made that up," Dorothy said. "It never happened."

"It *could* have happened," I said.

Next I bumped into an old pal whose memory was even worse than mine. Herbie was wearing an expensive navy-blue suit and a conservative tie. His gray hair was long and wavy and he comported himself with quiet dignity. To the best of my recollection, this same Herbie had been a big, obnoxious kid who always wore a ratty flannel shirt and dirty jeans hitched at half-mast. He and I and several others had often gone out looking for trouble together.

After Herbie introduced me to his wife, I started reminiscing. "Hey Herbie, do you remember how we used to go and poach beer and pretzels at Morgan's Market during lunch hour?"

Herbie glanced at his wife. "I don't remember any such thing," he said.

"Well surely," I went on, "you must remember the time the vice principal made you open your locker and all that contraband you were stashing in there spilled out on the hallway floor."

"Herbert!" the wife exclaimed.

"I don't know what you're talking about," Herbie huffed. With that, he took the little woman by the elbow and steered her toward the dance floor.

During the course of the evening, I met several of the "kids" my girlfriend and I used to hang out with. Conrad was a doctor. Bill was a college professor. Bunny, who had always been one of those Askers of Serious Questions, was as earnest as ever. "Are you happy?" she wanted to know. "Are you *really* happy? Are you really and truly a happy man?"

"No, Bunny," I said. "I'm a miserable old SOB and I'm going to drown myself in the swimming pool *right now.*"

I heard the obligatory hard-luck stories about classmates who were destined for greatness but had somehow gotten derailed. The most fascinating one concerned Beth, the class beauty, homecoming queen and winner of the Miss Delectable contest at the Annual Bratwurst Festival. She reportedly was last seen working as the Bearded Woman in a traveling carny show. (Actually, I made that up, too.)

Several faculty members were present and accounted for, more or less. My ninth-grade civics teacher mistook me for my brother and, when I gently corrected her, refused to believe that I wasn't. My senior adviser was there, too. She fixed me with her severe look, which made me feel 18 again, and asked: "What do you do?"

"I'm in journalism," I replied.

"It doesn't surprise me," she snapped. "You always did talk too much."

"You must be thinking of my brother," I said.

"No, I'm thinking of *you*," she said. She reached out and pinched me on the underside of my arm. "I may be in my nineties," she hissed, "but there's nothing wrong with *my* memory."

The basketball coach—Grumpy Gus, we called him—put in a brief appearance. I had never been one of his favorites. He had come up to me in the gym one afternoon when I was shooting free throws and said, "Doherty, did I see you smoking a cigarette after practice yesterday?"

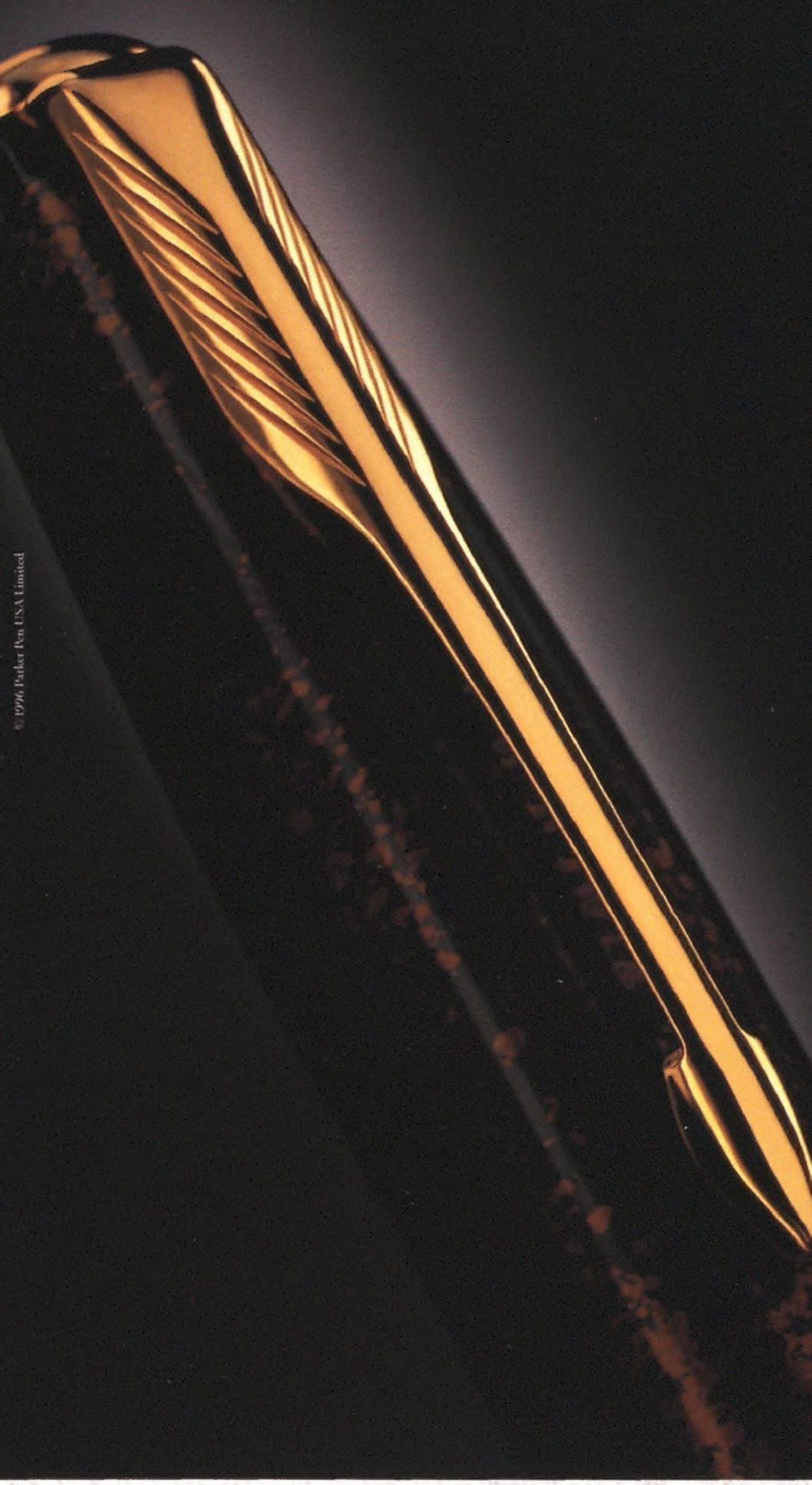
"No, Coach," I lied.

The next day my name was prominently posted in the locker room, along with the names of several others who had also been cut from the team.

When I saw Gus at the reunion, I decided to let bygones be bygones. "Well, Coach," I said, "you'll be happy to know I quit smoking." He didn't bat an eye. "It's too late now, Doherty," he barked. "You're still off the team."

I ended up feeling pretty good about my classmates. The biggest surprise was how little most of us had changed. The people who were interesting characters back in 1956 were still interesting characters, and the dorks—well, they were still dorks.

You're probably wondering about my high school sweetheart. I'm pleased to report that she seemed just as youthful and outrageous at the reunion as she was the night I asked her to go steady, which came as no surprise to me. After all, I've been married to this girl for the past 38 years.



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